

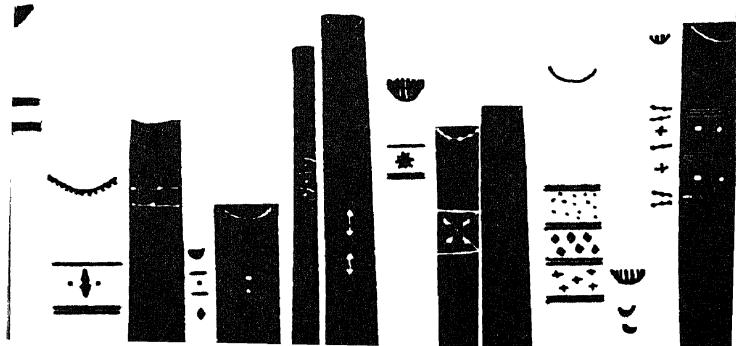


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# THE WORLD BOOK

ENCYCLOPEDIA

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*Volume Five*

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KANSAS CITY, MISSOURI

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# THE WORLD BOOK

MODERN

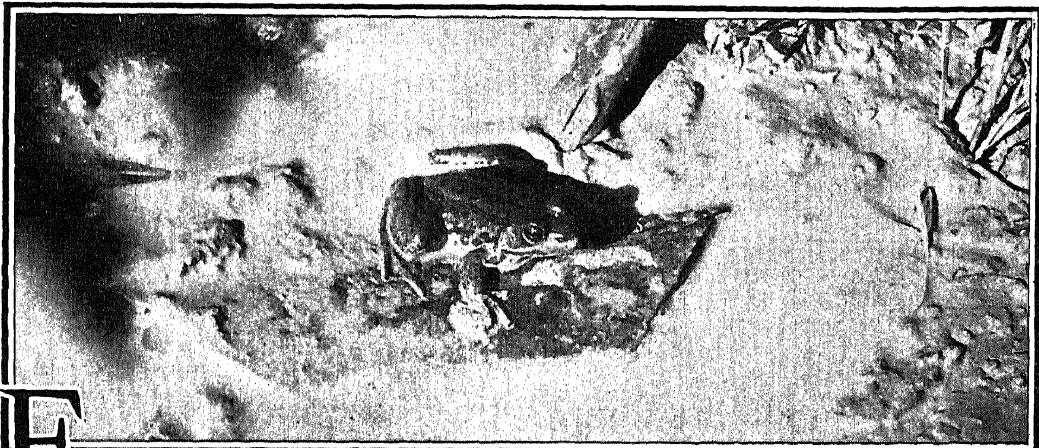
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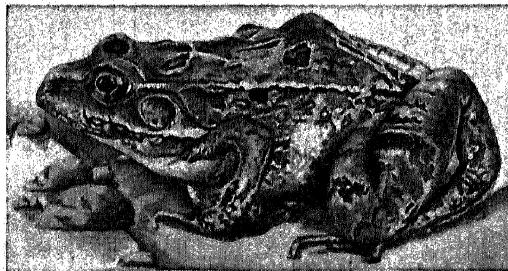
FIVE



## F

**F**ROG, a cold-blooded, tailless animal common in most parts of the world, though it is quite rare in South America. It belongs to the group of vertebrates called *amphibians* (which see), animals adapted to life on land and in the water. The chorus of frogs and their relatives, the toads, starts soon after the ice of ponds begins to thaw, and when pussy willows are gray. It lasts throughout the summer and until cool weather calls these choristers to their winter sleep.

Among the hundreds of Nature's wonders in the vegetable and animal life in swampy places, and along the shores of lakes and streams, the life of a frog is one of the most interesting.

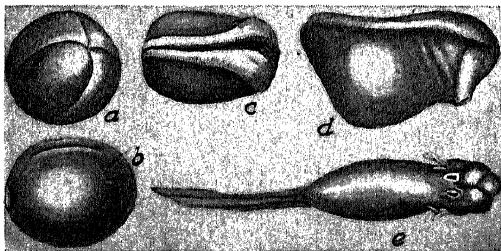


"When by night the frogs are croaking, kindle but a torch's fire;  
Hail how soon they all are silent!"

In early spring, the mother frog lays masses of tiny eggs, velvety black above, creamy white beneath. So small are they that a mass

of five or six thousand would measure only about five inches in circumference and two and a half inches in diameter. About the eggs a jellylike substance is secreted, which serves to absorb the heat of the sun and also protects the eggs from injury. The mass may be attached to a water plant or stick, or may float away on the water.

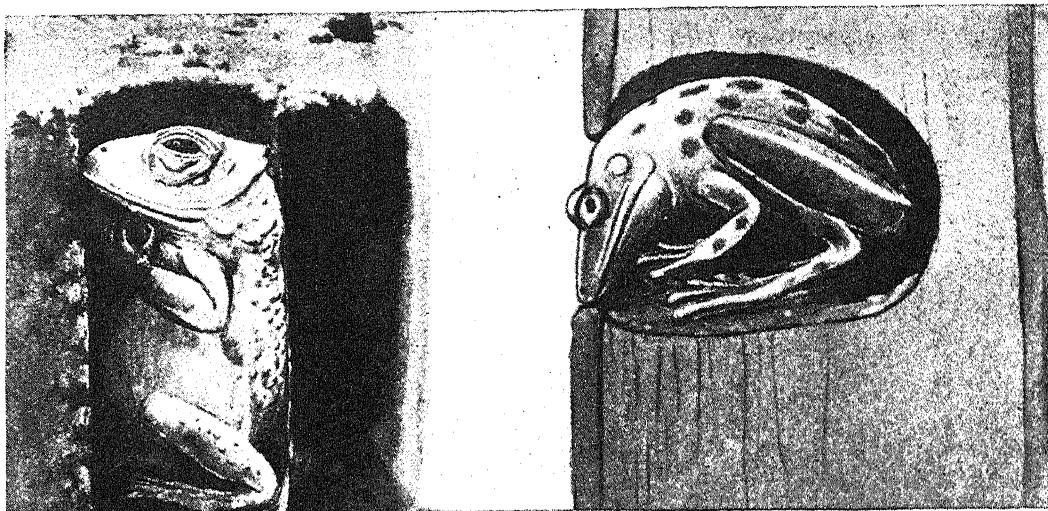
After wonderful growth and change, within nine days the tiny black specks have changed into queer little water animals, which look like



FIRST STEPS IN DEVELOPMENT

(a) Egg, drawn to show first two vertical grooves corresponding to two partitions which divide the egg into four cells. (b) Afternoon of third day; egg as seen from right side. (c) Next day; folds are closing in over grooves, to form the nerve tube. The front of this tube will form the brain, and the remainder will be the spinal cord. (d) Afternoon of fifth day; embryo in same position as b, though more fully developed. (e) Tadpole, a few days after hatching.

lumps of dark jelly. In this first stage, the larva cannot do much more than cling by a



PROTECTING THEMSELVES AGAINST INTRUDERS

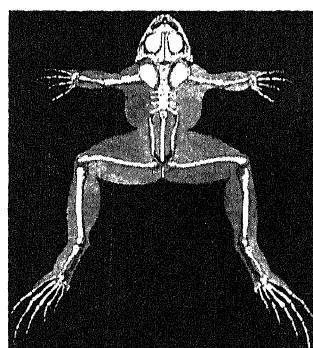
At left, the bony head of a frog may be used as a protective closed front door in the burrow. At right, a tree frog blocking the entrance to its home.

sucker-like apparatus to a floating leaf or other support. It breathes by tiny fringelike gills, and stays under water. But during the next five or six days marked changes take place. The external gills are covered up as the head grows larger, while the tail grows longer and is used as a swimming organ. A mouth is acquired. The lumps of jelly are now true tadpoles, swimming quickly about and feeding voraciously on aquatic plants and decaying animal matter. In two weeks or so, they develop four legs, the hind pair becoming visible first. Meanwhile, lungs have formed and the animals rise to the surface to breathe. The tails are then absorbed, and at last, within two or three months, there is a family of smooth-skinned frogs, keen of sight and hearing, fine swimmers, and wonderful jumpers.

A frog does not attain full growth for three or four years, however, and it is supposed to live ten or fifteen years. Grown frogs feed on insects, slugs, snails, etc. Aquatic frogs live on both land and water, but the tree frog lives almost wholly on land. Like toads, frogs frequently change their skins, and they eat their old suit of clothing while pulling it off over their heads. They also change color, somewhat to match their surroundings, from the green of lily pads to a duller shade nearer the brown of fallen leaves. Toads differ from frogs in having no teeth, being broader, flatter and darker, and in having larger eyes and a warty, slightly poisonous skin. The best-known frog in America is the *bullfrog*; other species are the *green spring frog*, the *leopard frog*, the *wood frog*, and the *edible frog*.

Frogs are useful to man because of their destruction of insect life. Man, both civilized

and savage, in addition to using them as bait in fishing, regards them as choice food. In France they are so highly prized that they are bred for the market in large quantities. In America, both the bullfrog and the spring frog are sold. Only the hind legs are eaten in America and in France, and they are usually served fried. In Germany, all muscular parts are stewed. See **BULLFROG** ; **TOAD**. M.J.H.



SKELETON OF A FROG

**Scientific Names.** Frogs belong to the family *Ranidae*. The bullfrog is *Rana catesbeiana*; the green spring, *R. clamata*; the leopard, *R. pipiens*; the wood, *R. silvatica*; the edible, *R. esculenta*.

**FROGFISH.** See **FISH (Some Interesting and Remarkable Fish)**.

**FROHMAN**, *fro'man*, CHARLES (1860-1915) and DANIEL (1853- ), theatrical managers, members of the theatrical syndicate organized in New York in 1895. Both brothers were born in Sandusky, O. The elder, Daniel, began his business career in a newspaper office, where he worked for five years. Subsequently, he became manager of a traveling theatrical company, and since then has managed many New York theaters and theatrical companies, including the Lyceum Theater, Daly's, and the Daniel Frohman Stock Company.

Charles Frohman has been called the "theatrical Napoleon" of America. Although given little early education, and ignorant of the theory of dramatic art, he instructed many accomplished actors in the proper methods of reading their lines. He was instrumental in bringing forward a great many well-known American actors and actresses, including Maude Adams, Ethel Barrymore, and John Drew. After managing several road companies, he obtained control of numerous New York theaters, as well as some in London. In 1895 he organized a theatrical syndicate, of which he was the head. During one typical season he put on twenty-five stage productions, employed 795 actors, and paid out salaries amounting to over \$25,000 a week. He produced more than 800 plays.

Frohman lost his life in the *Lusitania* disaster, on May 7, 1915. His last known words, spoken on the deck of the sinking ship, have become famous: "Why fear death? It is the most beautiful adventure that life gives us!"

**FROISSART**, *frwah sahr'*, or *froi' sart*, SIR JEAN (about 1338-1410?), a courtly French poet and historian. As one critic remarked, "Froissart's whole business was to live in the fourteenth century, and tell us what he saw there." His name stands for chivalrous adventure in the minds of all readers of history. His most famous work is the *Chronicles*, four volumes of vigorous, picturesque tales of the wars and other events of his century. In the poem *L'Espinelle Amoureuse*, he has given an account of his school days and early love affairs. He studied for the ministry, but his inclinations were toward writing stories and poems of chivalry and adventure. In 1361 he went to England to present one of his books to Queen Philippa, and spent five years at the English court as secretary to the queen. He was at Bordeaux on Twelfth Night, 1367, when Richard, the son of the Black Prince, was born; and he was bidden to write down the fact for his book of *Chronicles*. When Queen Philippa died in 1369, Froissart went back to his own country, where he worked diligently on his *Chronicles*. Not much is known of the last years of his life, and the date of his death is uncertain.

**FROM GREENLAND'S ICY MOUNTAINS.** See HYMNS AND HYMN TUNES.

**FROND.** See FERNS.

**FRONDE**, *froNd*, a French word meaning *sling*, is the name given to the period of civil strife in France during the minority of Louis XIV, from 1648 to 1653, and is also applied to the aggressive faction concerned in that struggle. The conflict was called the "War of the Fronde," or of the "Slingers," a contemptuous reference to the common use of the sling among the urchins of Paris. The movement

originated with the opposition of the Parliament of Paris to the tyrannical measures of Mazarin, the Prime Minister (see MAZARIN). In the insurrection which followed, the forces of the Parliament were overruled by the Prince of Condé, acting for the court party. Later, Condé quarreled with Mazarin, who arrested him. This action aroused the nobles and led to the Prime Minister's exile. Soon after, when Louis XIV came of age, he recalled Mazarin and placed Turenne at the head of the army. Condé was defeated near Paris in 1652, and this conquest led to the final victory of the court party and of Mazarin. See FRANCE (History).

**FRONTAL BONE**, one of the eight bones of the head (which see).

**FRONTENAC**, *froN te nak'*, COMTE LOUIS (1620-1698), an able, energetic, farseeing governor of New France, as the early French possessions in North America were known. He, together with Champlain and LaSalle, formed the trio which established the French power in America. It was Frontenac, more than any other man, who placed it on such a firm basis that it survived his death for three-fourths of a century.

When Frontenac was appointed governor of New France in 1672, he was in middle life. As a boy he had become a soldier, at twenty-three he was a colonel, and at twenty-six a brigadier general. He saw active service in Flanders, Germany, and Italy. His military habits, his occasional arbitrary commands, and his frequent outbursts of temper involved him in difficulties with the civil authorities of the province in America, after he became governor. He was tactful and masterful by turns in his dealings with the Indians, and the colony as a whole prospered under his rule. He encouraged exploration of the West, and his aid stimulated La Salle, Joliet, and Marquette. Meanwhile, he quarreled incessantly with the *intendant*, or treasurer, of the province, and with the priests, until finally, in 1682, he was recalled to France.

An interval of only seven years was enough to prove that New France needed Frontenac's iron rule, and in 1689 Louis XIV reappointed him as governor. It was the ultimate aim of the French to drive the English out of North America, or at least to restrict them to a narrow strip along the Atlantic Ocean. Frontenac at once began vigorous campaigns against the Iroquois, who were being encouraged and aided in their attacks on New France by the English. The New York and New England frontier became the scene of cruel warfare. Frontenac's bands of French and Algonquins burned and plundered, but were unable to make permanent conquests. In 1690 Frontenac defended Quebec against an English fleet, and in 1696 he finally compelled the Iroquois Indians to

sue for peace. The Treaty of Ryswick (1697), which put a temporary stop to the war, was followed in less than a year by the death of Frontenac. See FRENCH AND INDIAN WARS; CANADA (History).

**FRONT MOUNTAINS.** See COLORADO (Surface Features).

**FROST**, a beautiful formation of ice which bestows on bare and unsightly trees magic garments of sparkling crystal, and traces on



Photo: St. Clair

#### THE BEAUTIFUL TRACERY OF FROST

These winter nights against my window pane  
Nature with busy pencil draws designs  
Of ferns and blossoms and fine spray of pines,  
Oak leaf and acorn and fantastic vines  
Which she will make when summer comes again.

—T. B. ALDRICH: *Frost-Work*.

the windowpane, patterns as lovely as the most delicate filigree work. The work of "Jack Frost" is described in an old-fashioned poem that many a child has memorized:

He went to the windows of those who slept,  
And over the pane like a fairy crept;  
Wherever he breathed, wherever he stepped,  
By the light of the Moon were seen  
Most beautiful things; there were flowers and trees,  
There were bevvies of birds, and swarms of bees,  
There were cities with temples and towers, and these  
All pictured in silver sheen.

Frost is formed by the condensing of moisture on solid objects when the temperature falls below the freezing point,  $32^{\circ}\text{ F}$ . During the daytime, the earth absorbs much heat from the sun's rays; this heat it gives up again as soon as the sun sets. On the rapidly cooling surface of the earth, the moisture in the atmosphere is chilled and condensed; but so long as the temperature remains above  $32^{\circ}\text{ F}$ , dew is formed instead of frost. Thus, dew may be said to correspond to rain and frost to snow. When the frost deposit takes the form of snow-white ice crystals, thickly covering vegetation and other objects, it is called *hoar frost*. The frost formation on a windowpane occurs when the air out-of-doors is below  $32^{\circ}$ , the moisture being deposited on the glass in the form of tiny prisms of ice.

When the sky is cloudy at night, the ground cools less quickly than on clear nights, and for that reason, frost and dew are less plentiful after a cloudy night. In the growing season, farmers and fruit-growers watch the sky closely on chilly evenings. A cloudless sky is often a cause for anxiety, because frost is destructive to growing things. This is due to the fact that the juice of the plants, which is largely water, swells on freezing and bursts the delicate cells. Because of the damage done by late spring and early fall frosts, the subject of protection from frost has been made a matter of special study by the United States Weather Bureau, and the results are summarized in a bulletin entitled *On Frost Protection*. The use of orchard heaters is one of the most effective methods of saving frost-threatened trees. See DEW.

R.H.W.

**FROSTBITE**, a term applied to the effect of extreme cold on some part of the body. Mild cases are known as chilblains, which occur usually on the hands and feet (see CHILBLAIN). A frostbitten area has an unnatural whiteness and a sensation of numbness. Treatment is directed toward restoring the circulation and normal warmth of the affected part. The treatment must not be rapid, or too vigorous. Rubbing the frostbite with snow or ice, a method that brings warmth slowly, is a remedy long in use, but a more modern procedure consists in covering the part with a cloth saturated with cold water, the patient being kept in a fairly warm room. Rubbing with snow is likely to remove skin and otherwise do local injury. After the blood begins to circulate, the area should be rubbed gently with equal parts of alcohol and water, wrapped in absorbent cotton, and elevated. Until the frostbite is cured, it should be kept covered with vaseline and cotton. Severe freezing of the deeper tissues is dangerous, often resulting in gangrene (which see). Frozen limbs sometimes have to be amputated. Just as frostbite is one step beyond chilblains, so freezing is one step beyond frostbite.

After being frostbitten, the area is apt to be sensitized to cold; therefore chilblain, itching, and some swelling may result from exposure to a mild degree of cold.

W.A.E.

**FROUDE**, *frood*, JAMES ANTHONY (1818-1894), an English historian, of whom it is said that he was more a man of letters than an historian, as he was prone to distort facts. This tendency to misstate was not a conscious one, perhaps, but he selected certain details and suppressed others for the sake of dramatic effect. In spite of this admitted fact, the lucidity of his style ranks him among England's greatest historians.

**His Books.** The first two volumes of Froude's *History of England* appeared in 1856, and attracted



# FRUITS UNKNOWN to YOUR GREAT-GRANDFATHER

WHEN A BOY



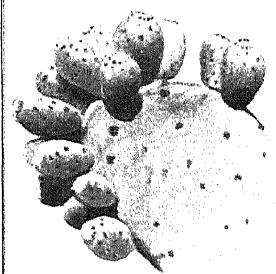
Guava



White blackberry



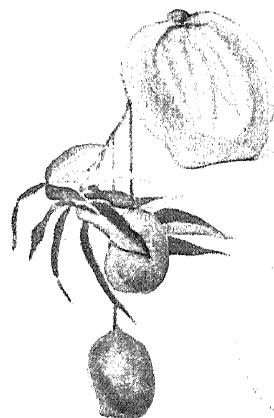
Kumquat



Cactus pear



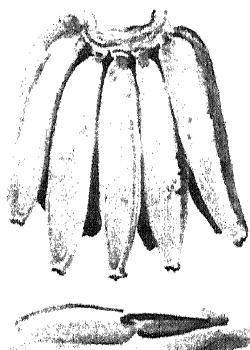
Alligator pear



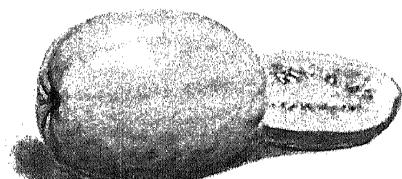
Mango



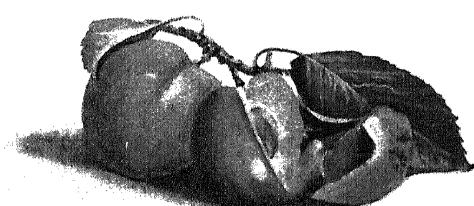
Grape fruit



Banana



Casaba melon



Plumcot

a great deal of attention on account of the author's brilliant style and the boldness of his opinions. After his visit to the United States in 1872, on a lecture tour, he published his lectures under the title *English Misrule in Ireland*. He was the friend of Carlyle, whose literary executor he became. After Carlyle's death, Froude published *The Reminiscences of Carlyle*, *Letters and Memorials of Jane Carlyle*, and *Thomas Carlyle: a History*. In 1892 Froude succeeded the historian Freeman as regius professor of history at Oxford. His lectures were afterward published in a volume entitled *Erasmus*. Among Froude's other works are *The English in Ireland in the Eighteenth Century* and *Life of Lord Beaconsfield*.

**FRUCTOSE, fruk tose'.** See BIOCHEMISTRY (Substances in Animals and Plants).

**FRUIT.** The present era is usually thought to be most noted for achievements in the field of mechanics, but when we see the wide variety of fruits almost always available in our markets, we realize that we are living in a "fruit age" as well as a mechanical age.

North America has become the home of more different kinds of fruit than any other country in the world. This condition has developed because of the wide range of climatic conditions, extending from the tropics to the extreme cold of the far north, and because of the large areas of land which can be devoted to fruit cultivation.

Other factors which have aided in the development include rapid transportation, by means of which fruit can be shipped quickly to market; cold-storage and refrigeration methods, which make possible the keeping of the fruit in good condition until it reaches the consumer; and improved methods of canning and drying, which are so efficient that the product deteriorates very little in the process.

The word *fruit* in botany refers to the seed of a plant and its covering. The fruit appears in widely different forms, as the pods of peas, as nuts, tomatoes, or apples. In popular usage, the term is applied to the edible products of certain plants, which are refreshing and of a pleasing flavor. The apple, pear, peach, plum, cherry, orange, lemon, date, and fig are among the most familiar true fruits in America; and among the native cultivated fruits of smaller growth habit, the strawberry, cranberry, and bunch grapes are most important. The fruits first cultivated by the early American colonists were varieties imported directly from Europe. But changes gradually took place in adapting the varieties to seasonal changes, so that by the latter part of the nineteenth century, the fruits cultivated were entirely American. The increased use of scientific methods also tended in the same direction. To-day, the United States ranks first in both the quantity and the variety of fruit produced.

The American states east of the Rocky Mountains, as well as those in the region of production, are now supplied with grapes and

raisins, citrus fruits, prunes, and apricots by the fruit-growers of California. Many other states, as well as California and the Northwest, furnish fresh grapes, fresh and canned peaches, pears, and cherries. Florida contributes its share of oranges, grapefruit, and pineapples. Canada receives a portion of the crop, as its yearly fruit production seldom meets the demand. During the winter months, Northern markets are supplied with strawberries, peaches, tomatoes, and other fruits grown in the states along the Gulf of Mexico. Many fresh fruits may now be purchased the year round, and all of the fruits have much longer seasons than formerly.

All sections are subject to occasional early frosts, and it has been found necessary to equip the orchards with smudge-pots to protect the trees. These consist of metal containers in which wood and pitch are burned to create a thick smoke. As this smoke fills the air, it prevents the frost from damaging the blossoms. Another protective measure is spraying to kill insect pests and plant diseases. This has been found a valuable aid, as it increases production and improves the quality of the fruit. The United States Department of Agriculture issues bulletins on the care and cultivation of orchards, which may be had on application.

**Food Value of Fruits.** Fresh fruits do not rank with meats and cereals in actual nutritive value, but they constitute a desirable portion of the diet for other reasons. Certain acids and salts found in them are believed to have a beneficial effect on the system, and their high water content, in some cases four-fifths of the whole, makes them valuable as laxatives. Moreover, they are among the most attractive of all foods, both in appearance and in taste, and the pleasure derived from partaking of them has a favorable effect on the appetite and the digestion. Decaying and unripe fruits should always be avoided, and it is also unwise to over-indulge in those at the proper stage of maturity. As a rule, fresh fruits eaten in moderation are thoroughly assimilated.

Carbohydrates, including sugars, starches, and pectin (vegetable jelly), constitute the most important nutritive material in fresh fruits. Protein, fat, and ash, the latter the source of certain acids and salts, are found in small proportions. The scurvy-preventing vitamin C is found in the juice of oranges, lemons, and grapefruit (see VITAMINS).

B.M.D.

**Related Subjects.** Descriptions of the various kinds of fruits will be found in these volumes in the following articles:

|            |            |
|------------|------------|
| Apple      | Breadfruit |
| Apricot    | Cassaba    |
| Avocado    | Cherry     |
| Banana     | Citron     |
| Blackberry | Citrus     |

|             |              |
|-------------|--------------|
| Crab Apple  | Olive        |
| Cranberry   | Orange       |
| Currant     | Pawpaw       |
| Date        | Peach        |
| Fig         | Pear         |
| Gooseberry  | Persimmon    |
| Grapefruit  | Pineapple    |
| Guava       | Plum         |
| Huckleberry | Pomegranate  |
| Kumquat     | Prickly Pear |
| Lemon       | Prune        |
| Lime        | Quince       |
| Loganberry  | Raisins      |
| Loquat      | Raspberry    |
| Mango       | Strawberry   |
| Mulberry    | Tangerine    |
| Muskmelon   | Watermelon   |
| Nectarine   |              |

See, also, the following general articles relating to the subject:

|                        |                  |
|------------------------|------------------|
| Agriculture            | Food Products,   |
| Boys' and Girls' Clubs | Preservation of  |
| Canning Clubs          | Horticulture     |
| Diet                   | Insecticides and |
| Food                   | Fungicides       |

**FRUIT FLIES.** While there are a number of different species of fruit flies, their habits are similar; and they can be considered as a group. In the United States, the apple and cherry maggots are of most importance, while in Mexico, Hawaii, and Southern Europe the Mediterranean fruit fly is a notorious and much-feared pest. Quarantines are now in effect to prevent the introduction of this insect into America, and because of its presence in some of the districts in Spain, Spanish grapes are no longer permitted entry. As a large portion of the crop of Spanish grapes was formerly shipped to the United States, their exclusion is a great handicap to the producers. This was of such importance that the Spanish diplomats have brought pressure, without effect, to have the quarantine removed.

The Mediterranean fruit fly now infests Florida, in particular, and there the scourge is spreading; the fruit-growers are suffering, owing to the sorting out of infected fruit, and indeed, to the destruction of entire crops over wide areas. Not only in Florida has this scourge appeared. It has been found from Texas eastward, and it attacks oranges and grapefruit. The maggots might become so common in citrus fruits that we would in time find ourselves accustomed to them; if they are eaten, they are not harmful. See ZOOLOGY (How Zoölogy Affects Human Welfare). W.J.S.

**FRUIT OFFERING.** See SACRIFICE.

**FRUIT PRESERVES.** See ADULTERATION OF FOODSTUFFS AND CLOTHING.

**FRUSTUM.** See PYRAMID; CONE.

**FRY.** See FISH (Fish Culture).

**FUAD,** king of Egypt. See EGYPT.

**FU-CHAU, OR FOO-CHAU,** in Southeastern China, and one of its treaty ports, was thrown open to foreign commerce in 1843. It is an ancient walled city, capital of the province of Fukien, on the Min River, thirty miles from

its mouth. The river is crowded with junks and boats, many of which are used as dwellings. The walls of the city are six and one-half miles in circumference and twenty-five feet high, with seven gates guarded by high watchtowers.

The River Min is here partly crossed by a stone bridge, 1,350 feet long, called the "Bridge of Ten Thousand Ages," leading to a densely populated island, which is connected with the opposite shore by a second bridge 300 feet in length. Below this bridge, ocean-going vessels load and unload their cargoes. Here also is the most important naval arsenal in the entire country. The chief exports are tin, timber, cotton goods, matches, and fruits. There is cable connection with Europe. Population, one estimate, 315,000; another, 614,000.

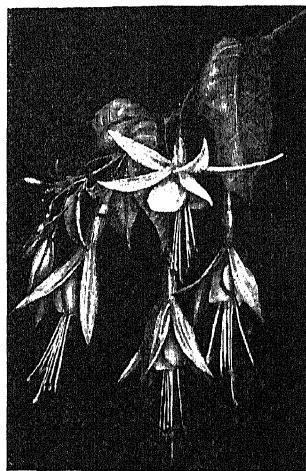
**FUCHS, LEONARD.** See FUCHSIA.

**FUCHSIA,** *fu' shi ah.* The fuchsias are a genus of beautiful house and garden plants, popular in America and Europe. There are about seventy species, most of which are natives of tropical America. Some are merely shrubby plants, some are small trees, and others are climbers. Grown as house plants, some of the species are herbaceous. With their gracefully drooping funnel-shaped flowers, usually white within and pink, red, or purple without, and pistils and stamens dangling, they very appropriately bear the name of *ladies' eardrops*, sometimes given them. The genus is named for its discoverer, Leonard Fuchs, a German botanist.

Fuchsias are most easily grown from cuttings. They demand a light, porous soil, plenty of water, and protection from strong sunlight. If planted in the spring in a partially shaded place, a fuchsia cutting will develop by fall into a fine plant. Some species make very satisfactory indoor winter plants, and will put forth lovely blossoms for many months if kept well watered and out of direct sunshine.

B.M.D.

**Scientific Name.** The genus belongs to the family Onagraceae or Oenotheraceae. Popular species used in the production of hybrids and varieties include *Fuchsia macrostemma*, *F. coccinea*, *F. fulgens*, and *F. speciosa*, the latter being considered a hybrid.



FUCHSIA BLOSSOMS

**FUCHSIN**, *fook' sin*. See BACTERIA AND BACTERIOLOGY (Bacteriology).

**FUEL.** When fire was first used by man is not known, but however far back in the distant past it may have been, the problem of obtaining materials to feed fires has ever since been one of great importance. When forests overran the land, a supply was always available, but as the value of wood for building purposes constantly increased, it was necessary to seek other substances. Coal, which has become the standard fuel by which all other fuels are measured, was known to the Greeks at least 300 years before the Christian Era. It possesses the advantage of furnishing great heat, but has the disadvantage of being heavy. Other solid fuels include coke, charcoal, peat, and bricks made from coal dust and tar or other adhesive substance. Liquid fuels include petroleum and its products, alcohol, and many kinds of vegetable and animal oils. The chief gases for heating are coal gas and natural gas.

**Heat Values.** Calculations based on experience show that the relative value of coal and wood is  $2\frac{1}{2}$  to 1; that is, two and one-half pounds of wood must be burned to produce the same amount of heat as would be obtained from one pound of anthracite coal. Oils have nearly double the heat value of coal, and are also less injurious to engines and furnaces in which they are used. Oil fires may be instantly started or extinguished; the oil produces little smoke and leaves no refuse. On the other hand, there may be danger of explosion, and there is always some loss of oil by evaporation. Three and three-quarter barrels of crude petroleum, each containing forty-two gallons weighing six and one-half pounds per gallon, have a fuel value equal to one ton of coal. The use of gasoline is increasing rapidly.

**Gases.** Natural gas is an ideal fuel, with fifty per cent greater heat value than coal gas. Because it can be obtained only in a few locations, however, its utility is not widespread. For domestic purposes, coal gas has many advantages. It prevents waste, as it need only be burned while its heat or light is actually needed. The heat value of 1,000 feet of gas is equal to fifty-nine pounds of anthracite.

Charcoal is extensively used in chemistry, industrial arts, and for melting metals. It burns quickly and leaves little ash. Coke produces violent heat and possesses qualities very similar to those of charcoal. Peat is a low-grade fuel that is used extensively for domestic purposes, especially in Ireland, where the greatest peat bogs abound.

**Fuels Used in America.** Bituminous (soft) coal is the principal fuel used in the United States, though for home heating plants, the production of smoke makes soft coal less desirable than anthracite, or hard coal. Hard coal is the best solid fuel for home heating,

but its high cost prevents its universal use in private homes. In the pioneer days, wood supplied about eighty per cent of the fuel needs of the country. Wood is now used in urban centers chiefly in fireplaces, but in the country, especially on farms possessing woodlots, or located near timbered areas, wood is still employed as a fuel in stoves. In cities, gas is the chief fuel for cooking, and in many modern homes oil burners are replacing the coal-burning plants. Electricity is used only to a limited degree, because of its relative expense. There are great fuel resources in America as yet little exploited. These are peat, lignite, and oil shale.

**Related Subjects.** The reader is referred in these volumes to the following articles:

|                      |             |
|----------------------|-------------|
| Charcoal             | Gas         |
| Coal                 | Gasoline    |
| Coke                 | Natural Gas |
| Electric Heating     | Peat        |
| Forests and Forestry | Petroleum   |

**FUELS OF THE HUMAN BODY.** See NUTRITION.

**FUEL VALUE OF FOODS.** See NUTRITION.

**FUGITIVE SLAVE LAWS**, statutes passed during the slavery controversy in the United States, providing for the return to their masters of runaway slaves escaping from one state to another. In the Ordinance of 1787 (which see), a clause provided for the return of slaves who had escaped to the free territory of the Northwest. The first fugitive slave law, passed in 1793, permitted an owner, upon the presentation of an affidavit, to secure the arrest and return of a slave who had escaped to free soil. The runaway slave had no right to trial by jury or to give any evidence in his own behalf. Some of the Northern states, opposed to the operation of this law, passed personal-liberty laws forbidding state officers to aid in the recovery of fugitives. In 1850 another fugitive slave statute was passed, inflicting heavy penalties for refusal to aid in the capture of runaway slaves. The owner's oath was made sufficient evidence for the slave's return. This law increased the sentiment against slavery throughout the North; the opposition reached its climax at the time of the publication of *Uncle Tom's Cabin*, by Harriet Beecher Stowe, and hastened the war between the two sections (see WAR OF SECESSION).

**FUGUE**, *fugw*, a musical composition in which the different parts are introduced in succession, and proceed to follow one another in the manner of a flight or chase. (The name is derived from *fuga*, the Latin for *flight*.) The theme, technically known as the *subject*, is given by the first voice in the principal key. Then the second voice follows with the *answer*, which is the subject transposed a fifth upward or a fourth downward. The first voice meanwhile proceeds with a second theme, called the

*counter-subject.* The third voice then introduces the subject an octave above or below the principal key, and is answered by the fourth voice. The subject and answer having been given in all parts, the first *development* of the fugue is considered closed. Then follows a passage in free style, called an *episode*, this being frequently a variation of the material of the subject. A second development is next introduced, in which the subject and answer follow in different order.

The fugue is made up of a series of developments, with intervening episodes; there are at least twenty-four sections in a fugue written for four voices. As many as 120 are available for a five-part fugue. There are many variations of the form described above, which is designated as *strict*. A *double fugue* is one in which two subjects in different parts are introduced at the start. Johann Bach (which see) was one of the greatest composers of fugue music of all time. See MUSIC.

**FUJIYAMA**, *foo je yah' mah*, FUJI-NO-YAMA, OR FUJI-SAN, the beautiful sacred mountain of Japan, rising 12,395 feet above the sea, sixty miles west of Tokyo. Each summer thousands of pilgrims from all parts of the empire climb by one of five paths to its summit, or worship at the shrines and temples along the way. Moreover, it is one of the most interesting objects in all Japan for tourists. Through Japanese legend and art, as shown on many objects, from beautiful screens to dainty fans or teacups, all nations of the world have come to know this perfect cone-shaped "Matchless Mountain," with its snow-capped peak caressed by clouds. That it was once a flaming volcano is now almost forgotten, for the last eruption from its crater took place in 1707. See illustrations, page 2633.

**FULBERT**, CANON. See ABELARD.

**FULCRUM**. See LEVER.

**FULGURITE**, *ful' gur ite*, from the Latin *fulgur*, meaning *lightning*, has two applications. In geology a fulgurite is a glasslike tube formed in loose sand or, rarely, in hard rock, through fusion of the material by a stroke of lightning. Fulgurites are apt to be found on mountain tops where violent thunderstorms are common. Mica and feldspar are among the minerals most easily melted in this way.

Fulgurite is also the name of a modern variety of dynamite, in which the absorbent material is magnesium chloride. See DYNAMITE. L.LaF.

**FULLER**, MELVILLE WESTON (1833-1910), Chief Justice of the United States Supreme Court for twenty-two years. In April, 1888, he was nominated by President Cleveland to fill the vacancy occasioned by the death of Chief Justice Morrison R. Waite. President Cleveland said that a Chief Justice was needed who would be a man of efficiency as a business manager, and within a year, under Fuller's

direction, the old-time delays in the business of the court began to be remedied. He systematized the work so as to eliminate the law's delays as far as possible.

Fuller was a graduate of Bowdoin College at the age of twenty, studied law at Harvard, and was admitted to the bar in Augusta, Me., in 1855. In 1856 he moved to Chicago, where he practiced law for thirty-two years. He became a member of the Illinois constitutional convention in 1862, the following year was elected to the state legislature, and four times was a delegate to the Democratic National Convention for the nomination of the Presidential candidates. He withdrew from active politics in 1880. He was an arbitrator of the Anglo-Venezuelan controversy in 1899. See VENEZUELA (History).

**FULLER**, SARAH MARGARET. See OSSOLI, SARAH MARGARET FULLER.

**FULLER'S EARTH**, an impure variety of clay which contains enough fine sandy and limy material to make it non-plastic. It is so called because, originally, it was used, in a finely powdered form, chiefly for removing grease from cloth and wool, a process called *fulling*. Fuller's earth readily absorbs impurities from oils and fats, and is a commonly used filtering medium in the purification of fats for soap-making. It is also used as a polishing powder. The production of fuller's earth in the United States has become an important industry. The leading states in its production are Florida, Georgia, Texas, Arkansas, and South Carolina. L.LaF.

**FULLING**. See FULLER'S EARTH.

**FULMAR**, a name applied to certain species of oceanic petrels. The common *northern fulmar* is about the size of a duck. It abounds in far northern seas, and breeds on the rocky shores of the Faroe Islands, Iceland, Greenland, and Spitsbergen, making an excavation in high, rocky places for its nest, in which it lays one egg. It is rarely found on the United States coast south of Massachusetts, or on the southern coasts of Great Britain, but is most in evidence on Saint Kilda, in the Outer Hebrides, Scotland, and neighboring isles. Its flesh and eggs are highly prized by the inhabitants of Saint Kilda. The bird is

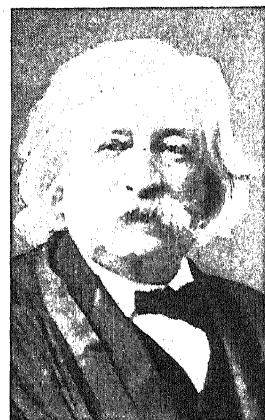
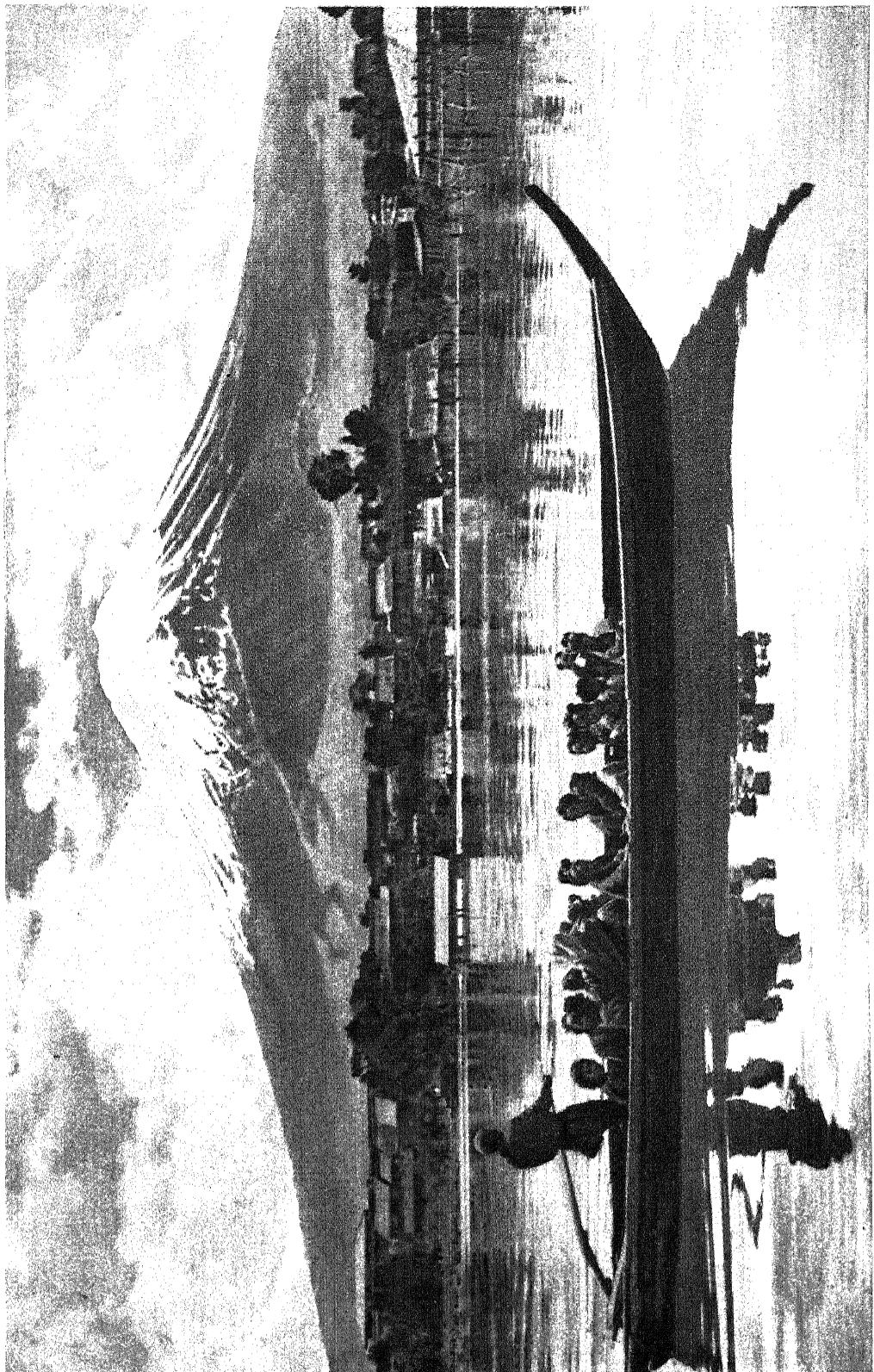


Photo: Brown Bros.

**MELVILLE W. FULLER**  
Forty-two years Chief Justice of the Supreme Court of the United States. He withdrew from active politics in 1880. He was an arbitrator of the Anglo-Venezuelan controversy in 1899. See VENEZUELA (History).



FUJIYAMA, THE "MATCHLESS MOUNTAIN"



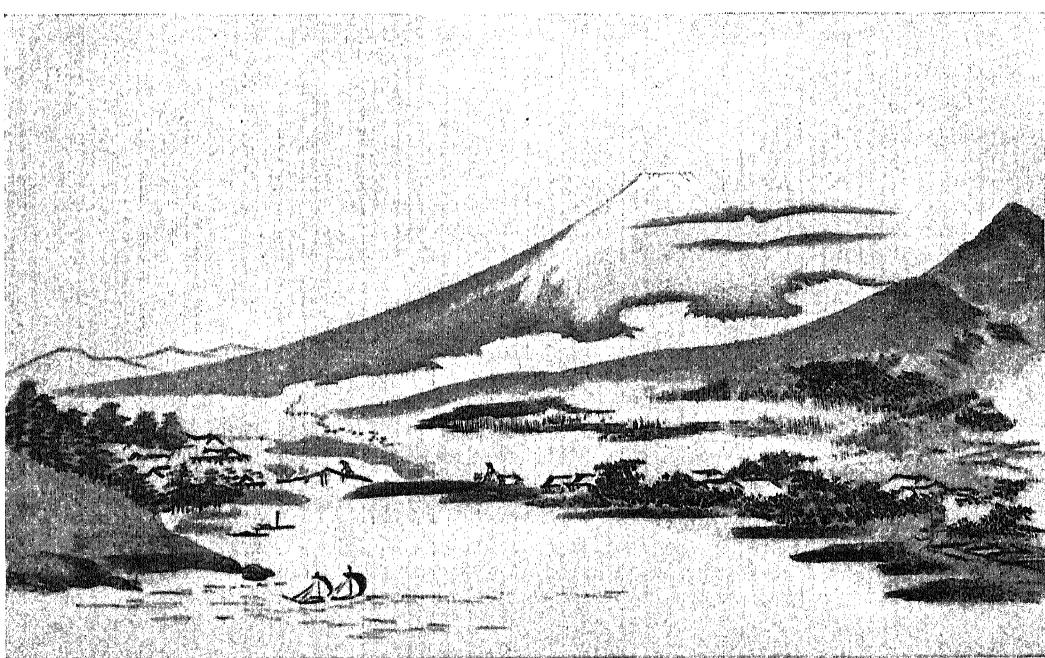
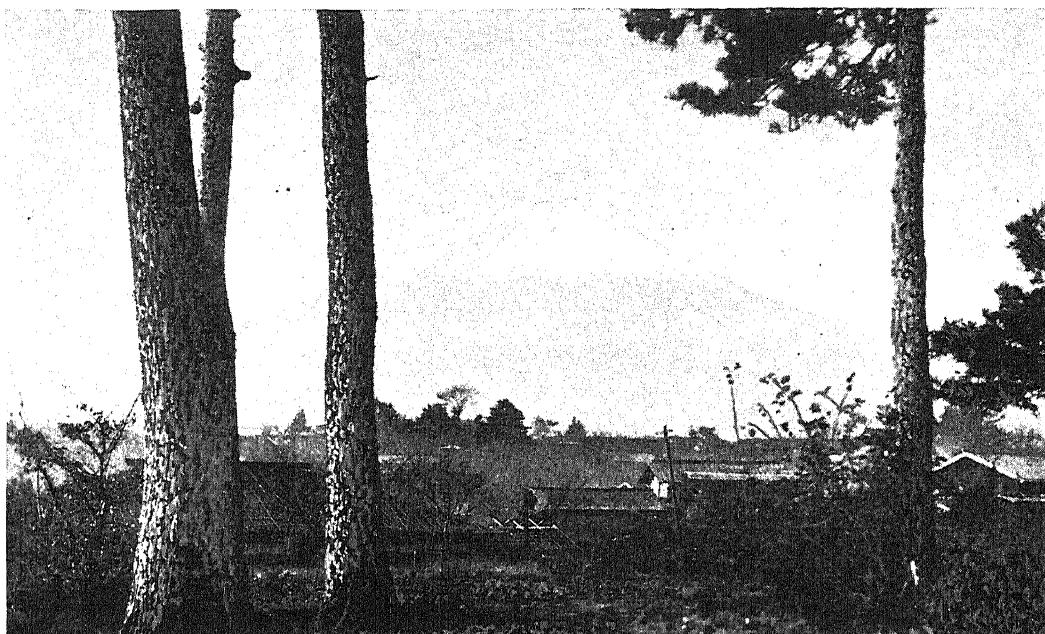
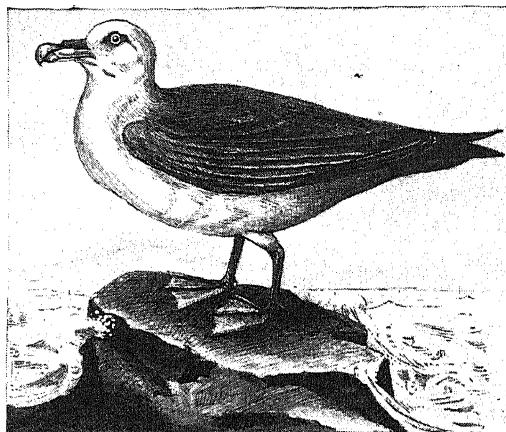


Photo at top: O R O C

## THE SACRED MOUNTAIN OF JAPAN

With the approach of day, snow-capped Fujiyama displays its hoary peak anew. The photograph at the top was taken from the shore of Lake Kawaguchi, at dawn. Below is a print from a Japanese water color. Probably no other spot of natural beauty in Japan has been so popular a subject for Japanese artists for hundreds of years as has this sacred mountain.

also valued for its feathers, down, and oil. It feeds on any animal substance, having a preference for whale blubber. See PETREL. D.L.



A FULMAR

**Scientific Names.** Fulmars belong to the family *Procellariidae*. The northern fulmar is *Fulmarus glacialis*. In the Pacific Ocean are found the Pacific fulmar, *F. g. glupischa*; the giant fulmar, *Ossifraga gigantea*, and the slender-billed, *Priocella glacialisoides*.

**FULMINATION**, an explosion of certain compounds by percussion or heat. There are some very powerful explosives, such as picric acid and T.N.T., that cannot be made to explode quickly with full force, or detonate, unless they are ignited by means of a sudden and intense blow, such as would be imparted by an explosive preparation that itself detonates with tremendous velocity. Such preparations are called *fulminates* or *detonators*. The chemical in most common use for this purpose is fulminate of mercury, a compound of mercury, carbon, nitrogen, and oxygen. It is manufactured by dissolving mercury in nitric acid and adding alcohol to the solution. The fulminate is deposited in crystals.

This compound is widely used to initiate explosions in blasting, and as a detonator in the percussion caps of shells and bullets. For blasting purposes, it is enclosed in small copper tubes, and is set off by a burning fuse, or by a primer ignited by electricity. Fulminate of mercury is so powerful, and so sensitive to shocks that it is mixed with other substances to lessen its violence. Potassium chlorate and sulphide of antimony are most commonly employed in fulminate compositions. Silver, gold, platinum, and some other fulminates have been made, but are little used. See EXPLOSIVES. T.B.J.

**FULTON, N. Y.** See NEW YORK (back of map).

**FULTON, ROBERT (1765-1815).** Inventors are often thought to be impractical, interested

in contriving something without putting it to immediate use. In Robert Fulton there existed the rare combination of inventive genius and the practical sense of the business man. He made a successful trip with the first steamboat from New York to Albany on Monday, August 17, 1807, and by September 4 of the same year, he had started a regular packet service between these two cities. An advertisement in the Albany *Gazette* of September 2 states: "The North River steamboat will leave Paulus's Hook Ferry on Friday the 4th of September at 6 in the morning and arrive at Albany at 6 in the afternoon. Provisions, good berths, and accommodations provided." Thus was inaugurated a commercial venture which brought success to its originator and laid the foundation for a great enterprise in the field of transportation.

Fulton was born at Little Britain, Pa., a town which has since been rechristened Fulton, and because of the poverty of his parents, he was in school only long enough to learn to read and write. While working for a jeweler, he took up portrait and landscape painting with such success that he was able to buy a farm, and in 1787 to go to London to study painting with his noted fellow-countryman, Benjamin West. Acquaintances there discovered his mechanical genius, and induced him to devote himself to engineering. A patent for a double-inclined plane to be used instead of canal locks, patents for flax-spinning and rope-making machines and for a marble-cutting mill—these were evidences that his ability was of the practical and usable kind.

In 1796 Fulton went to Paris, and there worked diligently upon one of his great ideas—a submarine torpedo boat. Though he demonstrated the value of his invention, no government was interested in it, and he turned his serious attention to the making of a steamboat. The first successful one was launched on the Seine in 1803, but the French government refused to take up this invention, and Fulton returned in 1806 to the United States, having first revisited England and sent home an engine. In 1807 he launched upon the Hudson the famous *Clermont*, which puffed slowly up the river, to the amazement of the thousands of spectators who had gathered to watch the wonder. The boat was described by a skeptical onlooker as "an ungainly craft looking precisely like a backwoods sawmill mounted on a scow and set on fire." Five miles an hour was its average speed, but an increase in that proved a comparatively easy matter, when once the inventor had established the principle. Later, Fulton constructed for the United States government various engineering works and the steam frigate *Fulton*, launched in 1815, and was engaged on an improvement of his submarine torpedo when he

died. Great honor was paid him in his later years, and he had the happiness of knowing that his work was appreciated. He might have been wealthy, but lawsuits over the infringement of his patent rights kept him almost poor, and hastened his death. In 1909 a centennial celebration of the launching of the *Clermont* was held, and an exact model of that boat steamed slowly up the Hudson.

**FUMIGATION**, *fu mi ga-shun*, the act of applying fumes or smoke for disinfection of clothes or houses and the eradication of vermin and rodents. The agents that are generally employed for this purpose are sul-

places as warehouses, where valuable goods are stored. In one instance alone, goods valued at \$75,000 were saved from moths by one fumigation. See DISINFECTANTS; FORMALDEHYDE.

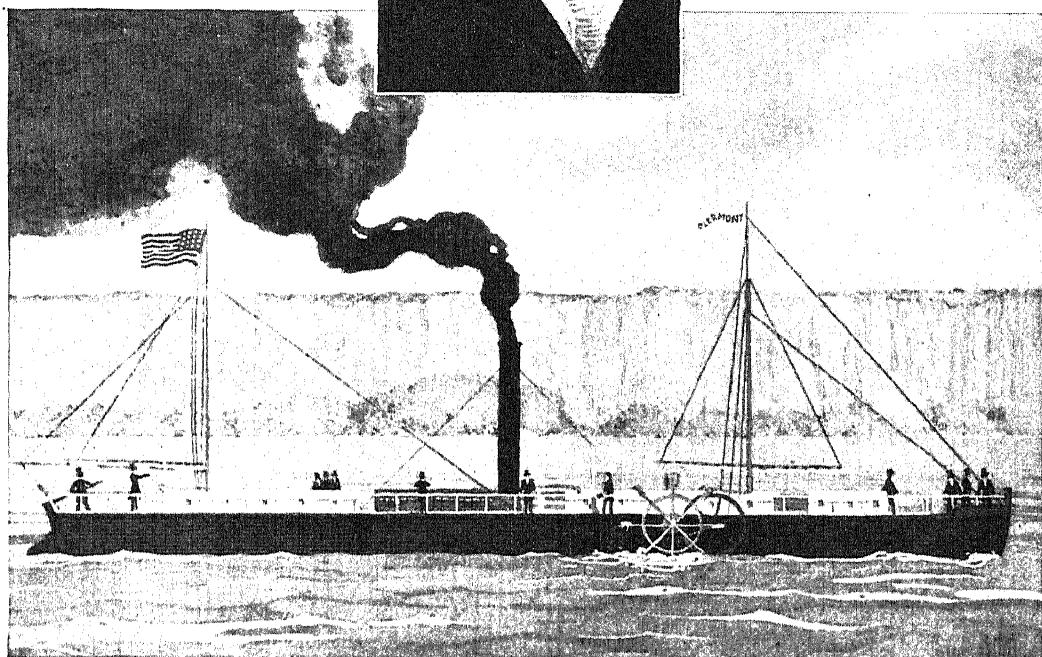
**FUNCHAL**, *foon shahl'*, the Portuguese name for the Madeira Islands. See MADEIRA.

**FUNCTIONAL DISEASES**. See MEDICINE AND DRUGS.

**FUNDAMENTAL CONSTITUTION**. See NORTH CAROLINA (Early History); SOUTH CAROLINA (History).

**FUNDAMENTALISM**. See EVOLUTION (Objections to the Theory of Evolution).

**FUNDAMENTAL NOTE**. See SOUND (Quality of Sound).



ROBERT FULTON AND THE "CLERMONT"

Photos: Brown Bros.; Visual Education Service

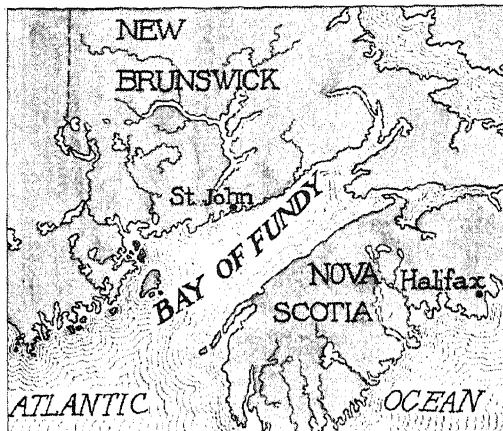
phur, formaldehyde, and chlorine gas. Sulphurous gases, formerly used as disinfectants, have irritating qualities, and as they tarnish silver and brass and have an unpleasant odor they have been generally superseded by formaldehyde solutions, which cause no damage and are efficacious in destroying infectious germs. After fumigation has taken place, a room should be kept closed for six hours, then be well ventilated and opened to sunlight. Thorough cleaning and sunning of rooms should always accompany fumigation, as the latter is not an infallible process. Fumigation has proved especially valuable in such

**FUNDAMENTAL ORDERS**. See CONNECTICUT (History).

**FUNDY, BAY OF**, an arm of the Atlantic Ocean, separating the southern part of the Nova Scotia peninsula from New Brunswick. It is 180 miles in length, with an average breadth of thirty-five miles; at the mouth, its breadth is forty-eight miles. At the head, it divides into two branches, that on the north called Chignecto Bay, and the southern, Minas Channel; the latter gives entrance to Minas Basin and Cobequid Bay. On its northern shore, it receives the waters of the Saint John and the Saint Croix rivers, both of which form

part of the international boundary between New Brunswick and the state of Maine.

The bay is noted for its high tides, which sometimes rise more than fifty feet at the entrance to Chignecto Bay, and cause dangerous



LOCATION MAP

borees, or tidal waves. There is a general belief that the tides here are the highest in the world; this is an error, since they reach equal heights in numerous other places where conditions are similar to those in this broad bay, with its narrow head (see TIDES). Fogs are frequent in the bay, and make navigation difficult.

Passamaquoddy Bay, opening off its western shore, is a magnificent natural harbor. A project is on foot to dam this tributary bay for a distance of five miles, in connection with the installation of a giant hydroelectric plant, by which a part of the mighty tides would be utilized. The chief ports on the Bay of Fundy are Moncton, Saint Andrews, and Saint John in New Brunswick; Annapolis and Digby in Nova Scotia. At the entrance, there are numerous islands off the coasts of Maine, New Brunswick and Nova Scotia.

**FUNEN.** See DENMARK.

**FUNERAL MOUNTAINS.** See DEATH VALLEY.

**FUNERAL RITES.** There were many ancient rites connected with the burial of the dead. The word *funeral* is related to an old Sanskrit term meaning *smoke*, and in this connection referred to an ancient practice of cremation. Among the Romans, the burial of the dead took place at night, torchlights being used. This was to prevent priests and magistrates from becoming ceremonially unclean by witnessing a corpse, and thus being prevented from performing their duties.

Many of our present-day rites have been borrowed from the Romans, such as assuming a black garb, the use of emblems or insignia upon the casket, walking in procession, and

raising a mound over the grave. Undertakers, accompanied by lictors in black, followed the corpse. The funeral couch was covered with flowers, as was the grave or tomb. The Greeks crowned the corpse with a wreath. Among other peoples, a bell was rung to drive away evil spirits who were supposed to be waiting for the newly-released soul.

The *lykewake*, or watching with the dead, was once a universal custom. The North American Indians buried the warrior's bow and arrow with him; the horse and the armor of the Norsemen were laid beside him; the Egyptians placed with the dead in the tomb food and clothing and the principal objects used during life. All these people believed



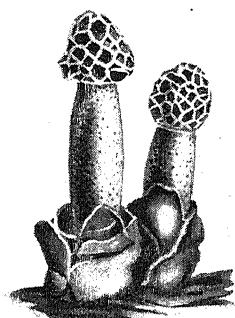
AN INCA BURIAL SPOT

A "chullpa," or burial house, of one of the tribes of present-day Inca Indians. It stands near LaPaz, Bolivia, and is one of many similar memorials. The lads shown in the illustration are Boy Scouts from the LaPaz Institute.

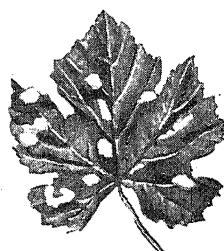
that such articles would be needed in the next world. An *obolus*, or coin, was left in the Greek tombs as Charon's fee (see CHARON). Games were held in Greece and Rome in honor of dead heroes. All such rites were either honors shown for the dead, or an effort to propitiate the gods, or to supply the departed spirit with what was deemed necessary for life in another world. See BURIAL; CREMATION.

[In the article MOURNING will be found additional interesting information.]

# FUNGI

Stinkhorn,  
Inedible

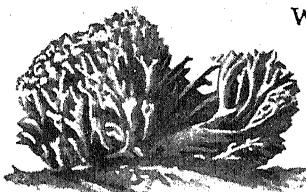
Cup Fungi, Edible

Grape Mildew on  
Grape Leaf

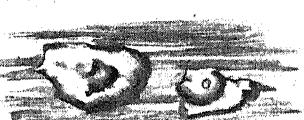
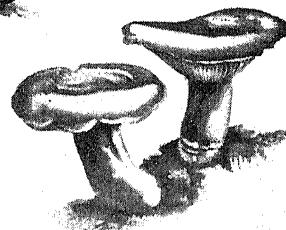
Wheat Smut



Puffball, Edible



Coral Fungi, Edible

Slime Mold on  
decaying board

Poisonous Toadstool

**FUNGI**, *fun' ji*, flowerless plants which have no green coloring matter (chlorophyll) to enable them to manufacture their own food. Thus they have to live on other plants or animals, either dead or alive. It has been estimated that there are about 250,000 fungi, only about one-third of which have been described. They grow everywhere—in water, and in and above the soil. Some are so small they cannot be seen with the naked eye; some, like the toadstools, grow as high as two feet.

There are two general classes of fungi: one comprises those forms that live on dead or decaying things, known as *saprophytes*, or saprophytic fungi; the other group includes the *parasites*, or parasitic fungi, which grow on living plants or animals. Some species, including many of the mushrooms and truffles, are edible; others are used in medicine and the arts, and all are beneficial, in that they turn

plant matter back into soil. Numerous species, however, are very destructive to useful plants; among these are the smuts, rusts, mildews, and molds. Many others cause disease in man and animals.

B.M.D.

**Related Subjects.** The reader is referred in these volumes to the following articles:

Bacteria and  
Bacteriology  
Botany  
Chlorophyll  
Cryptogams  
Decomposition  
Disease  
Mildew  
Mold  
Mushrooms

|                               |       |
|-------------------------------|-------|
| Parasite (Plant<br>Parasites) | Smuts |
| Puffball                      | Soil  |
|                               | Yeast |

**FUNGICIDES**, *fun' ji' sydz*. See INSECTICIDES AND FUNGICIDES.

**FUNGOID DISEASES.** See DISEASE (Disease of Plants).

**FUNGUS KILLERS.** See INSECTICIDES AND FUNGICIDES.

**FUNNY BONE**, a so-called bone, located at the outer bend of the elbow, which is not a



AN EDIBLE MUSHROOM  
(*Boletus edulis*)

Photo: Visual Education Service

bone, but a nerve, called the ulnar nerve. It is so near the surface that little protection is afforded it, and even a slight blow landing directly over it is the cause of considerable pain.

**FUNSTON**, *fun' stun*, FREDERICK (1865-1917), major general of the United States army, seasoned veteran, and modern military hero. He traveled from the Arctic regions to the tropics, in various capacities, finding adventure everywhere. Born at Carlisle, O., he was successively instructor in the state university at Lawrence, Kan., a farmer, train conductor, and newspaper reporter. In Alaska, where he was sent by the United States Agricultural Department to report on the plant life of the country, he made the longest trip ever attempted by a white man on snowshoes. He paddled 1,100 miles alone down the Yukon in an open boat, and secured important botanical specimens.



MAJOR GENERAL FUNSTON

In 1896 Funston joined the insurgents in Cuba against the Spaniards, was wounded three times, and later captured. Upon his release, he returned to the United States. At the outbreak of the Spanish-American War, the "Fighting Bantam of the Army," as Funston was called (he was only five feet tall), became colonel of the Twentieth Kansas Volunteers, and was ordered to the Philippines, where he was the hero of many daring exploits. After the capture of Aguinaldo, which is the most celebrated, although not the most thrilling, of his adventures, President McKinley appointed him brigadier general. He was placed in charge of the work of restoration of peace and order after the San Francisco earthquake in 1906.

When difficulties with Mexico seemed certain in 1913, General Funston was given command of the American troops at Vera Cruz, where his varied experience again made him of invaluable service to his nation. In 1916, when the United States sent an expedition into Mexico to capture the bandit Villa, Funston was put in command [see MEXICO (Civil War)]. He did not accompany the forces south, however, the immediate command being given to his subordinate, General Pershing (see PERSHING, JOHN J.).

On February 19, 1917, while on active duty, General Funston dropped dead in a San Antonio (Tex.) hotel.



**F**UR AND FUR TRADE. The story of the fur industry parallels that of man himself. The first men to prepare furs for use were the cave men of prehistoric times, who killed wild beasts to secure their pelts as a protection from the cold. From that age to this, men have willingly risked their lives in the pursuit of fur-bearing animals. Traders and trappers have been pioneers in the exploration of northern lands and seas, spending long winter months in the frozen wilderness in order to bring back to civilization in the spring the results of their skill and courage.

Although the search for a route to the East, and later, the cod fishing, were responsible for a part of the early exploration and colonization of the United States, the unending quest for furs played a vastly important part in the early history of the country. The fur trade of North America, says Constance Skinner, in *Adventurers of Oregon*, encouraged and sus-

tained the earliest French and English explorations inland, was the chief spoil in the colonial wars, and swept across the continent, the forerunner of colonization. It saw the last days of its greatest romantic glory in old Oregon.

The animals chiefly sought are the seal, beaver, badger, marten, ermine, muskrat, fox, skunk, wolf, wolverine, lynx, sable, mink, otter, and bear. So great is the present demand for furs that, to furnish the supply, many millions of wild animals are killed every year. The best furs are obtained during the coldest weather in the coldest regions of the earth. At such times, fur-bearing animals are provided with a thick woolly covering beneath the long hairs of the fur, and to this extra covering is due the value of the pelt. Trading posts have been established in all fur-producing countries, with stores from which trappers may purchase supplies. At these posts, huge quantities of

skins are collected, to be later sold by auction in the world's great fur markets.

**Centers of the Industry.** Prior to the World War, there were three outstanding world markets for fur—London, England; Leipzig, Germany; and Nizhni Novgorod, Russia. In North America, Montreal, New York, and Saint Louis (Missouri) were great centers of trade, but dressed furs were largely imported from Europe, where the supremacy of the dyeing industry securely rested. The war caused a revolutionary shifting of the business. Forced to take action by the demoralization of the dye business and the curtailing of imports, American furriers seized the opportunity to establish the fur-dressing industry in their own country. Expert sorters, dressers, and dyers were induced by offers of high salaries to leave the European centers, and as a result, the United States became the most important center in the world for finished fur. While European furriers are endeavoring to win back their supremacy by severely cutting prices, there is little likelihood that America will lose its advantage, at least in the distribution of general-utility furs, such as beaver, muskrat, seal, and wolf. Chicago has developed rapidly as a fur market, and is closely pressing Saint Louis. The latter city, however, is still the largest American center for raw furs, especially sealskins. The wave of prosperity which swept over America during and after the war, the vogue of summer furs, and a general appreciation of the beauty and comfort afforded by a good fur coat have all been factors in stimulating and holding the fur trade in the United States.

**Sources of Supply.** The chief fur-bearing animals left in the United States proper are muskrat, skunk, and raccoon. Alaska produces the greater part of the fur supply of the country. From there come the prized Alaska fur seal (not Hudson seal), fox, marten, mink, beaver, otter, lynx, bear, wolf, wolverine, ground squirrel, rabbit, and weasel. In Canada, where the Hudson's Bay Company has had an uninterrupted career since 1670, the muskrat heads the list, followed by marten, mink, beaver, ermine, wild foxes of all kinds, the otter, skunk, fur seal, lynx, wolf, and bear. The romantic story of the greatest fur-trading company the world has ever known is told elsewhere in these volumes under the title **HUDSON'S BAY COMPANY**.

From the Old World come many of the choicest and most beautiful furs in the trade. These include so-called Persian lamb, from karakul sheep raised in Bokhara and Turkestan, in Central Asia; astrakhan, a black lambskin from Southern Russia; krimmer, a gray lambskin from the Crimea; squirrel, sable, and marten, from Russia; and sable and ermine from Siberia. South America supplies nutria and

chinchilla; Africa, leopard and lion skins; China and Siberia, kolinsky. Australia and Belgium export millions of rabbit pelts, as these, when dressed and dyed, are sold under a wide variety of trade names (see **RABBIT**).

**Fur Conservation.** Many well-meaning people have seriously advocated a public boycott of all fur garments, on the ground that hunting and trapping subject defenseless creatures of the wilds to excruciating torture. The fur trade is also fought because of a possible extermination of the most valuable species. In regard to the first objection, it may be said with truth that life in the wilds under natural conditions is always cruel and relentless; larger species prey on smaller, and most of the carnivorous animals will kill and eat their own kind under stress of hunger. Trapping and hunting are almost everywhere regulated by laws that aim to lessen or eliminate suffering. In the case of the fur seal and some other fur-bearers, regulated slaughter of superfluous males is actually humane, for in the mating season many mothers and their young are killed in the fights for the harems.

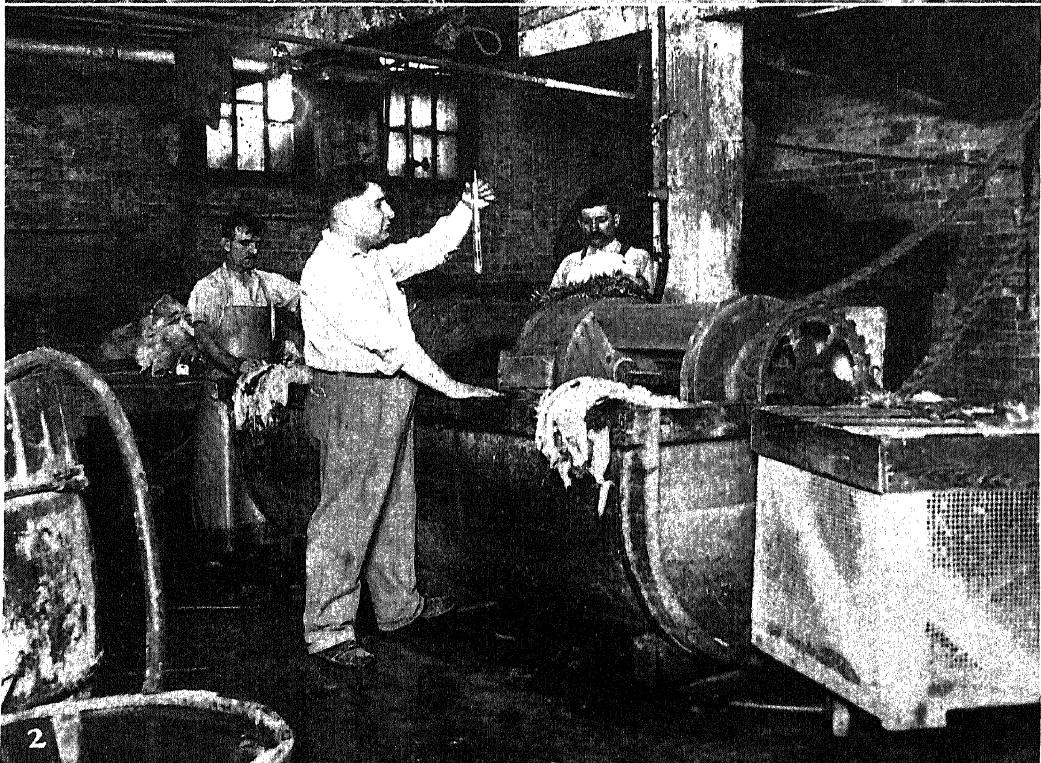
The careful observance of open and closed seasons, strict enforcement of laws by game wardens, and similar restrictions for the protection of wild life are being adopted by states and provinces in the effort to conserve our valuable sources of fur supply. Because so many of the fur animals are very prolific, conservation measures are gratifyingly effective, but success depends, of course, on the co-operation of trappers and traders, and on the control of poaching and other illegal practices, such as the killing of immature animals whose pelts are "unprime." The fur seal of Alaska would have been exterminated by this time had the United States not taken over the control of the fisheries and stopped deep-sea seal-hunting by international treaty. For details, see the article **SEAL (The Fur Seal)**.

**Fur Farming.** This comparatively new industry is now on an established basis in both the United States and Canada, having expanded from a small beginning in Prince Edward Island about 1890. Fox farming is the most important branch of the industry, and a special phase of it is the breeding of black and silver-tip foxes, based on the same principles as the breeding of pure-bred cattle. Black and silver-tip foxes were originally found as exceptional offspring of the red fox, but by selective breeding they have become, in effect, new species. Their fur is so beautiful and so difficult to imitate, that it may be said to occupy among furs the place that the diamond does among jewels. Farms or ranches have also been equipped for raising blue, white, and red foxes, marten, chinchilla, fisher, mink, raccoon, muskrat, skunk, and several varieties

(Continued on page 2645.)

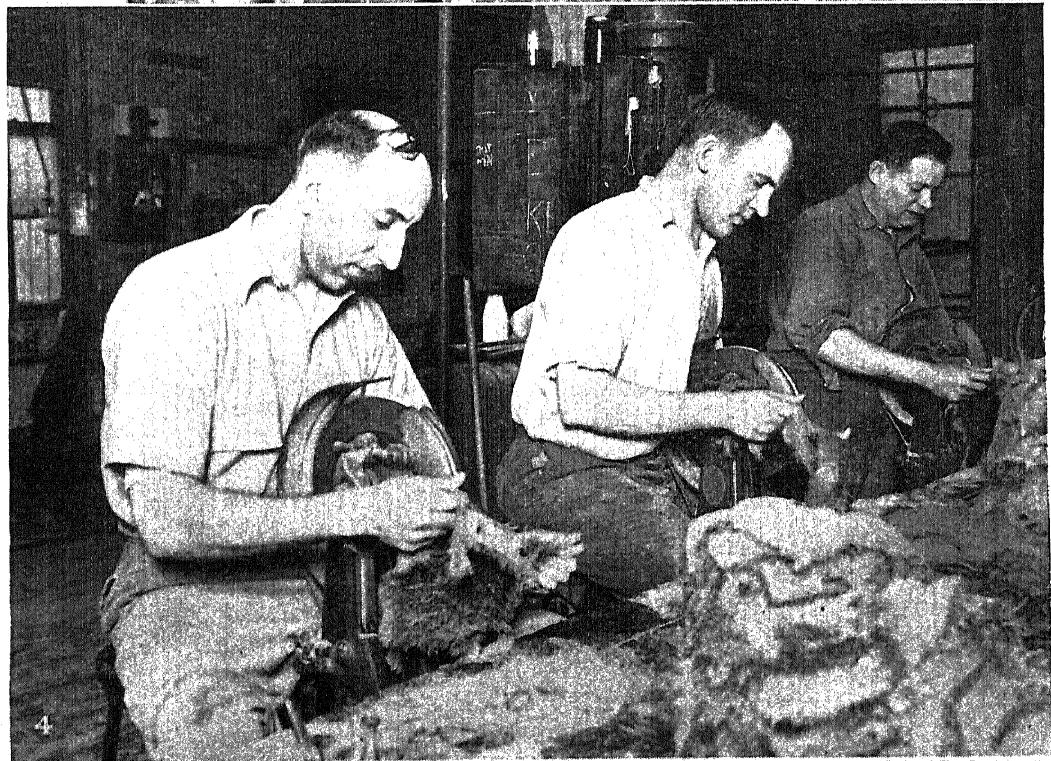


1



2

Courtesy: National Fur Dressing Co.  
How Furs Are Made Ready for Market. (1) Scraping the first layer of grease and oil from the hide.  
2640 (2) Tanning department.



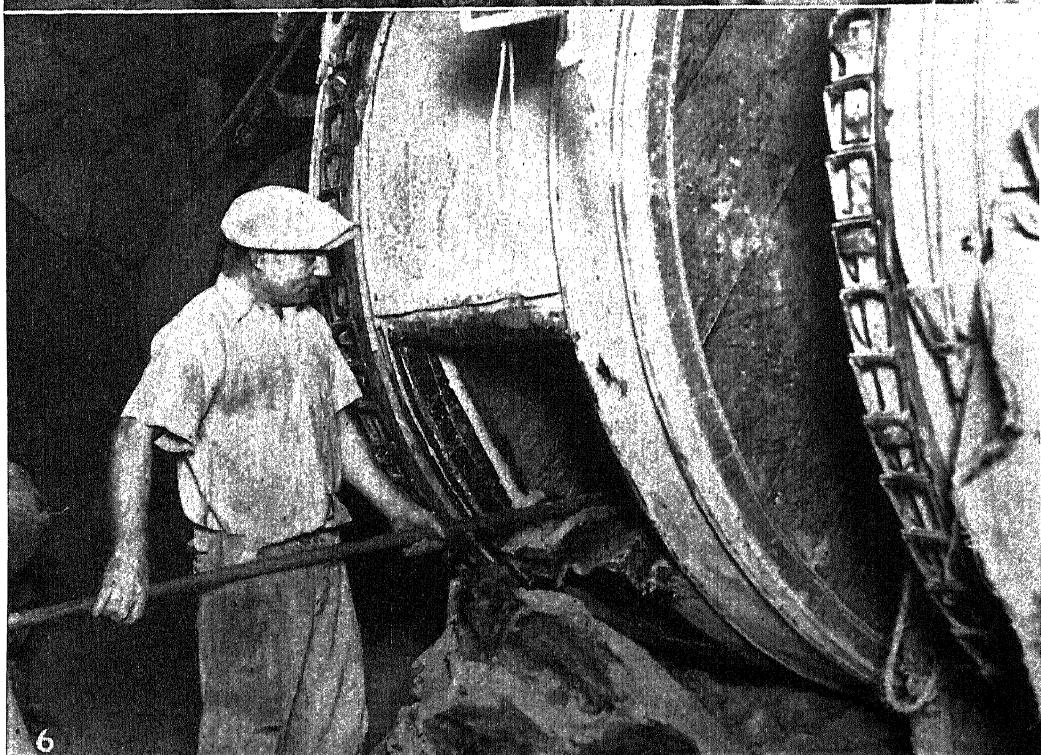
Courtesy: National Fur Dressing Co.

**How Furs Are Made Ready for Market.** (3) Removing excess tissue from the pelt, by hand. (4) Another method of removing flesh, by a revolving wheelknife.

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5



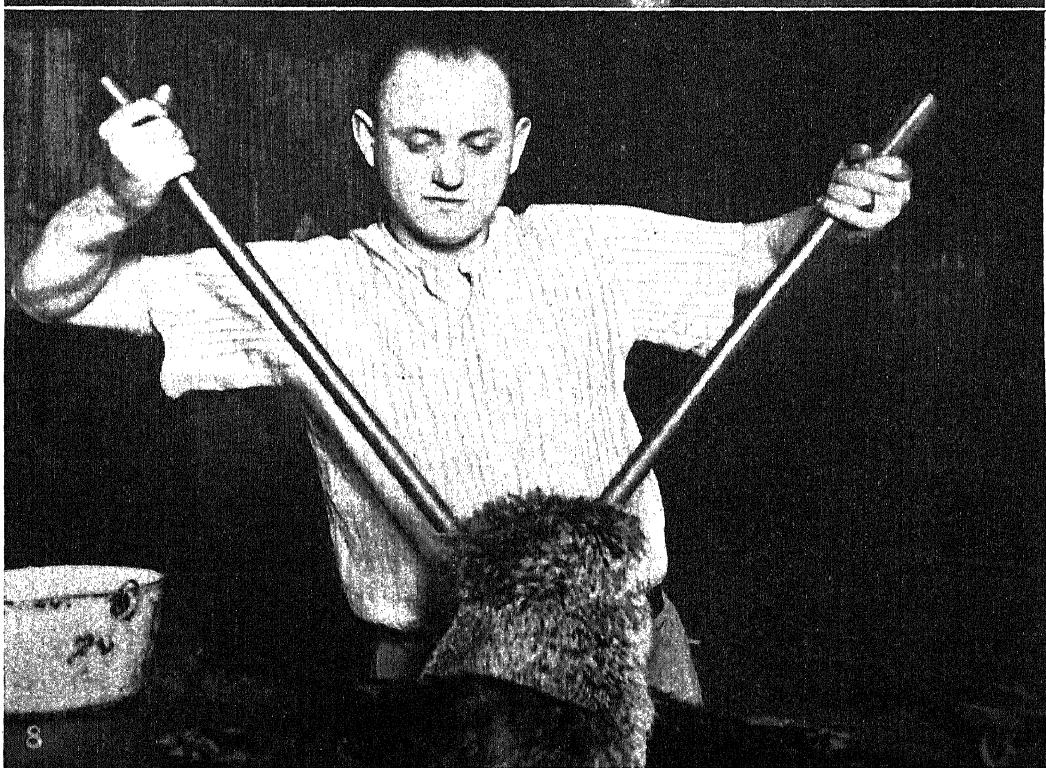
6

Courtesy: National Fur Dressing Co.

**How Furs Are Made Ready for Market.** (5) Mink furs are rolled and pressed, to give the pelt a soft, chamois-like finish. (6) A cleaning machine.



7



8

Courtesy: National Fur Dressing Co.

How Furs Are Made Ready for Market. (7) Restoring oil to the pelt. (8) Stretching the skin of a silver fox, to widen it.



Courtesy: National Fur Dressing Co.

**How Furs Are Made Ready for Market.** (9) Examining and stretching furs, by hand. (10) Final inspection before shipment.

of rabbits. In 1924 a Division of Fur Resources was created in the United States Biological Survey, and fur farmers may have the benefit of its experiments and investigations. It is estimated by the United States Department of Agriculture that about \$30,000,000 has been invested in all kinds of American fur farming, including Alaskan enterprises. The Federal government really carries on farming operations in its regulation of the fur seals of Alaska, and in its care of the wild blue foxes that inhabit the Pribilof Islands. In the winter, these foxes are fed from the summer's seal kill. Efforts are also being made to establish a karakul-sheep industry in the United States.

**Imitations and Trade Names.** The demand for fur among all classes has inevitably led to an extensive development of the manufacture of imitation furs. In some cases, the workmanship is so skilful that only experts can detect the difference between the imitation and the genuine fur. The marketing of imitation furs is not unethical, provided there is no deception and the garments are not overpriced. However, the custom of selling dyed furs under trade names that mislead has developed to such an extent that a reaction has followed, and the best leaders in the fur auctions, together with the more reliable retailers, are advocating the use of the true name for every fur sold. The table below gives some of the most common trade names in general use:

| TRUE NAME                | TRADE NAME                              |
|--------------------------|---|
| Dyed Rabbit              | Sable; French Seal                      |
| Unhaired Dyed Rabbit     | Electric Seal                           |
| White Rabbit             | Ermine                                  |
| White Rabbit Dyed        | Chinchilla                              |
| Seal-Dyed Muskrat        | Hudson Seal                             |
| Dyed Fitch               | Sable                                   |
| Dyed Marmot              | Mink; Sable                             |
| Dyed Mink                | Sable                                   |
| Pulled and Dyed Nutria   | Seal; Electric Seal;<br>Hudson Bay Seal |
| Pulled Natural Nutria    | Beaver; Otter                           |
| Skunk                    | Black Marten; Alaska<br>Sable           |
| Dyed Hare                | Sable; Fox; Lynx                        |
| Natural Muskrat          | River Mink                              |
| Mink-Dyed Prairie Dog    | Marmink                                 |
| Broadtail-Processed Lamb | American Broadtail                      |

Some of the fur-bearing animals have practically lost their original names. Thus, nutria has replaced coypu, the name of a South American aquatic rodent; kolinsky is the accepted name of the red sable or Siberian mink; the European polecat is known as fitch. Even the common cat is beginning to be a factor in the fur trade, under the name genet. In order to clarify the situation for its customers, the National Association of the Fur Industry has compiled a glossary giving the names under which furs are advertised and sold.

**Preparation of Furs.** The trapper does not prepare the pelts for market, but he must deliver them to the dealer in suitable condition for dressing and finishing. The skinning of trapped animals is an operation requiring great care, as any damage materially lowers the value of the pelt. In the piercing cold of the far north, the animals are generally frozen hard and stiff when removed from the trap. Before they can be skinned, they must be thawed in the hut of the trapper. The skins of all small animals, such as minks, martens, otters, foxes, and ermine are removed "closed." With a sharp knife, a cut is made from the center of the hind claws up the leg, across the body, and down the other leg to the claws. The tail is skinned by forcibly removing the stump without cutting the skin, which is then turned inside out and removed from the body like a glove. The skin is stretched on a piece of wood of the proper shape, with the fur inside. The skins of larger animals, such as wolves and bears, are removed by being cut from the throat the full length of the body.

Dressing and dyeing operations are largely trade secrets, but it is known that they are complicated and demand the skill of experts. Machinery for many of the processes has been perfected and is in general use, though some operations must always be done by hand. Fragile skins like that of the mole likewise require special hand work. A dyed mink skin is subjected to the following operations by Canadian fur dressers (as given by the *Canadian Conservation Report*): The skin is pounded, soaked to soften head, fleshed, flesh pickled, dried, drummed with sawdust, greased and pounded, stretched, drummed (sawdust), stretched, drummed (sawdust), stretched and beaten, dyed. B.M.W.

**Related Subjects.** Most of the animals referred to in the foregoing article are described elsewhere in these volumes. For additional information, consult the following:

|        |                  |
|--------|------------------|
| Alaska | Game (Game Laws) |
| Canada | Hibernation      |

**FURIES**, *fū' riz*, in Greek mythology, three sisters named Alecto, Tisiphone, and Megaera, who were attendants of Proserpina, the goddess of death and the underworld. They sprang from the blood of the wounded Uranus, and were noted for their hard hearts as well as the merciless manner in which they hurried the ghosts intrusted to their care over the fiery flood of the river Phlegethon to eternal torment. Their heads were wreathed with serpents, and they watched remorselessly for every soul they could catch. Vergil says in describing Hades:

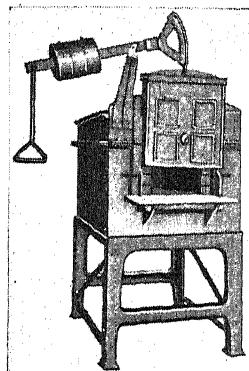
. . . before the gate,  
By night and day, a wakeful Fury sate,  
The pale Tisiphone; a robe she wore,  
With all the pomp of horror, dy'd in gore.

**FURLONG**, an English term for the distance of forty rods, or one-eighth of a mile. It originally referred to the length of a furrow, which would ordinarily be the length of a field, but like other originally indefinite terms of measure, it gradually acquired a definite value. Among the old English writers, one-eighth of a mile of any of the world's standards of measurement was called a furlong, and as early as the ninth century, the word was used in the sense of the Latin *stadium*, which was one-eighth of the Roman mile. The term is now little employed. See MILE; DENOMINATE NUMBERS.

**FURNACE**, an enclosure or structure of metal, brick, earthenware, or other material, in which a fire developing great heat may be maintained. The heat is utilized for melting metals, heating a boiler, baking pottery, warming a house, and for many other purposes. The furnace should be so constructed as to provide the greatest possible heat from the fuel consumed, and to concentrate the heat where it is most required. The fire in ordinary *air furnaces* is kept burning by natural drafts. When extreme heat is required, air is forced through the fire by bellows or blowing machines. Furnaces fitted with such devices are called *blast furnaces*. For melting metals, a *reverberatory furnace* is sometimes used. In this device, the flames are forced against a low, arched roof, from which they are deflected to the objects to be melted.

The furnaces mentioned above burn coal, coke, or wood. Those requiring gas fuel are becoming steadily more important, and have great advantages over those burning coke or coal. Gas leaves no ash; it produces a very high temperature, and can be instantly lighted or extinguished. The newest development is a furnace which burns oil; this is described in the article HEATING AND VENTILATION.

**Electric Furnace.** The electric furnace, which is of recent invention, has proved so successful that it has revolutionized the steel industries, for by means of it, a temperature far higher than that ordinarily reached in any of the older types of furnaces is easily obtained. To the reader without technical knowledge of such matters, it might seem that



ELECTRIC FURNACE

This particular type is adapted to general heat-treating operations encountered in the manufacturing processes in industrial plants. It has a maximum temperature of 1850 F.

the temperature of 2000° obtainable in a non-electric furnace must be high enough for any process, but the worker with metals finds that there are various processes which can be satisfactorily carried on only by means of the 3500° to 6000° temperature which the electric furnace affords. Carborundum, graphite, high grades of iron and steel, calcium carbide, and aluminum are best produced in this intense heat.

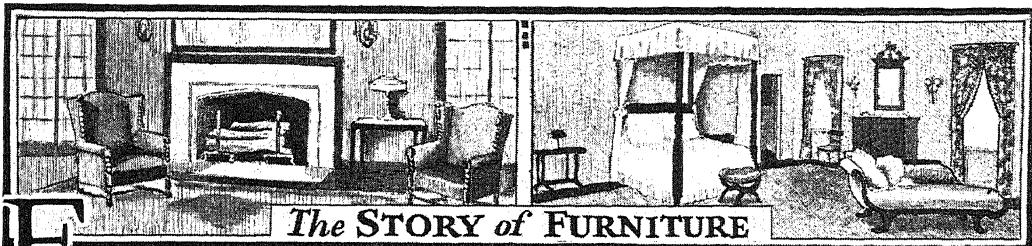
Electric furnaces are of two types—electrolytic and incandescent. If the electric current passes through a liquid, the furnace is of the first-named type; if it passes through a solid, it is of the incandescent type. See ELECTRIC HEATING.

**FURNESS**, HORACE HOWARD (1833-1912), an eminent American Shakespearean scholar who was credited with knowing more about Shakespeare, his plays, their sources and texts, than any other man since the days of that greatest of all dramatists. In 1871 he published the first of his famous series, known as the *Variorum Shakespeare*, which included fifteen volumes, each a monument of patient study.

Dr. Furness was born in Philadelphia, was educated at Harvard College and at Halle, in Germany, and was admitted to the bar in 1859. He represented the finest type of the leisurely scholar; but neither the deafness with which he was afflicted, nor his seclusion from the activities that make up modern life, could make him unsympathetic with his fellow men. It is said he always carried in his pocket a card upon which was written, "Don't blame the driver. It is not his fault. I am deaf."

**FURNISS**, HARRY (1854-1925), a British caricaturist, author, and lecturer, was born at Wexford, Ireland, and educated in Dublin, where he studied art and edited a *Schoolboy's Punch*. Later, he went to London and contributed drawings to the *London Illustrated News* and *Punch*; he joined the staff of the latter in 1884. His grotesque drawings of statesmen and politicians became popular because they were apt and amusing, and his illustrations of the parliamentary section of *Punch*, which he called *Diary of Toby, M.P.*, were other features. His *Royal Academy Guy'd*, published annually as a supplement to *Punch*, and his volume of burlesques on the work of contemporary artists, called *Royal Academy Antics*, were outstanding successes. He made original and humorous illustrations for a number of novels, fairy stories, the works of Dickens, and the centenary edition of Thackeray.

Furniss toured the United States and the British Empire, lecturing, writing, and producing photoplays. His World War cartoons were numerous, but not as skilful as his earlier work. He published his memoirs, *Confessions of a Caricaturist*, in 1901.



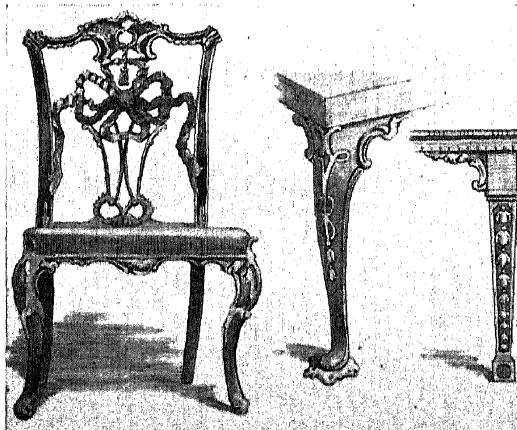
## F The STORY of FURNITURE

**FURNITURE.** The furnishings of the typical modern household are the result of little more than four centuries of furniture-making, for furniture in the present sense of the word is a development of our later civilization. Marbles, and such costly woods as cedar and ebony, and ivory, bronze, gold, silver, and precious stones have been used from earliest times in the construction and decoration of household furnishings, but even the most magnificent mansion of the ancient Egyptians, Assyrians, Greeks, or Romans lacked many of the familiar appliances found to-day in the humblest home. The chair, the couch, the table, and the bed were the principal articles of furniture used by ancient and medieval peoples. In Europe, fixed tables were the exception until the sixteenth century, the usual custom being to lay sets of boards across uprights when it was time to serve meals, and chairs did not become common until the seventeenth century. A modern householder would think the medieval castle of the European nobleman a meagerly furnished place indeed.

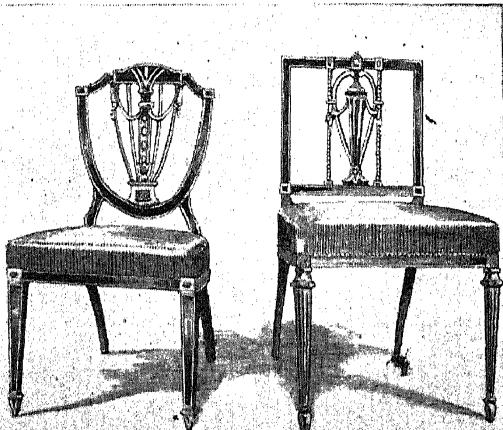
**The Notable French Periods.** The awakened interest in all forms of art was extended to furniture during the period of the Renaissance (which see), and Florence, Rome, Venice, and Milan became important centers of cabinet-making. The Italian influence was felt especially in France, where, during the reigns of

Louis XIV, XV, and XVI, furniture of the most exquisite design was produced. Under the first of these three monarchs, the curved line in furniture became established; in the reign of Louis XV, the love of ornamentation reached its height, many of the cabinets, commodes, bureaus, and bookcases of the period showing painted landscapes elaborate in design and brilliant in hue. Marvelous effects were also produced through carving, inlaid work, and the use of bronze or brass ornamentation. In this reign, also, there was a return to the straight line in furniture, which prevailed through the next period. Mahogany became the favorite wood of the cabinet-makers under Louis XVI, but gilded or enameled walnut was also used. Among the most notable achievements of this period are the Louis XVI chairs and sofas, with fluted, tapering legs, and carved frames enclosing beautiful tapestry backs. During the Napoleonic empire, grace, elegance, and refinement were replaced by heaviness and solidity; this is known as the period of decline.

**English Development.** In England, as in France, the eighteenth century was a period of achievement in cabinet-making. Under the four Georges, from about 1715 to 1830, mahogany took the place of walnut and oak, previously used, and the furniture of the period shows a decided contrast to the massive



CHIPPENDALE DESIGNS  
A chair, and cabriole and taper legs of tables.



SHERATON CHAIRS  
Two chairs in the characteristic Sheraton designs.



Louis XVI

square types especially characteristic of the Elizabethan Age. Grace and beauty mark the work of the three great masters of the Georgian period—Thomas Chippendale (died 1779), “the master of line”; George Heppelwhite (died 1785), “the exponent of elegance”; and Thomas Sheraton (1751-1806), “the purist.” Each of these cabinet-makers set a fashion in furniture which has become an established vogue.

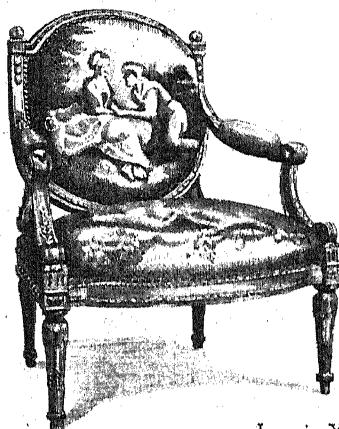
Chippendale’s chairs best represent his genius (see illustration). These are characterized by the curved leg (cabriole), with ball and claw foot, the outward-curving side frames of the back, and the top rail shaped more or less like a cupid’s bow. Especially beautiful in design are the centers of the backs, which he filled in with carved ribbon or lattice work, showing an almost limitless variety of figures. Chippendale’s name is also associated with china cabinets and bookcases with glass fronts, writing desks with glazed doors, settees beautified by fretwork, and tables of various designs. His furniture is notable both for its solidity and its delicacy.

In the construction of his chairs, Heppelwhite, like Chippendale, produced his most characteristic designs. The backs are usually oval or shield-shaped, with decorative middle-pieces, and the legs are square and tapering. Exquisite proportion gives these chairs an ef-

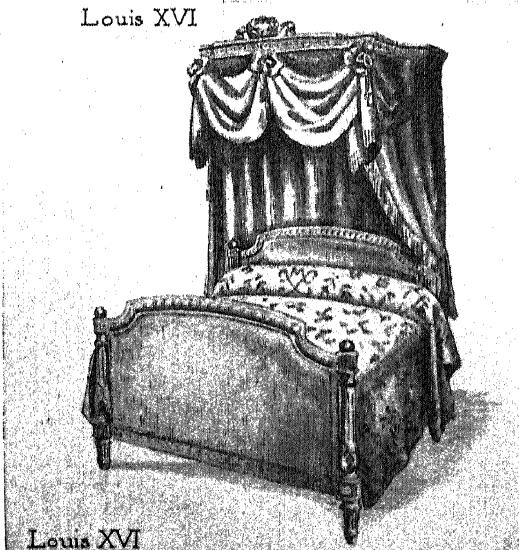
fect of remarkable elegance and refinement. Heppelwhite also perfected the sideboard in its modern English form, and his furniture shows the most tasteful use of inlay and veneers in the history of English cabinet-making. To him, also, are attributed many choice urn stands, tea trays, chests, and caddies.

Sheraton’s name is associated especially with furniture decorated with painting. He worked both in mahogany and in satinwood, and in his tasteful use of inlay, he was almost the equal of Heppelwhite. Practicability as well as beauty distinguishes his furniture. He invented a summer bed divided in the center in such a way as to permit a better circulation of air; a hollow-front sideboard; and the work table with a pouch of silk on each side, which is still popular with housewives. His satinwood furniture consisted mainly of commodes, bureaus, small writing desks, toilet tables, and other boudoir furnishings, many of which were exquisitely decorated with painted designs.

**Modern Taste in Furniture.** All of the French and English eighteenth-century styles of furniture have been copied by European and American manufacturers, and these have made their way into many twentieth-century homes; the true “period” furniture is used chiefly in homes of wealth, where perfection and consistency in every detail of the furnishing scheme may be achieved. Adap-



Louis XVI



Louis XVI

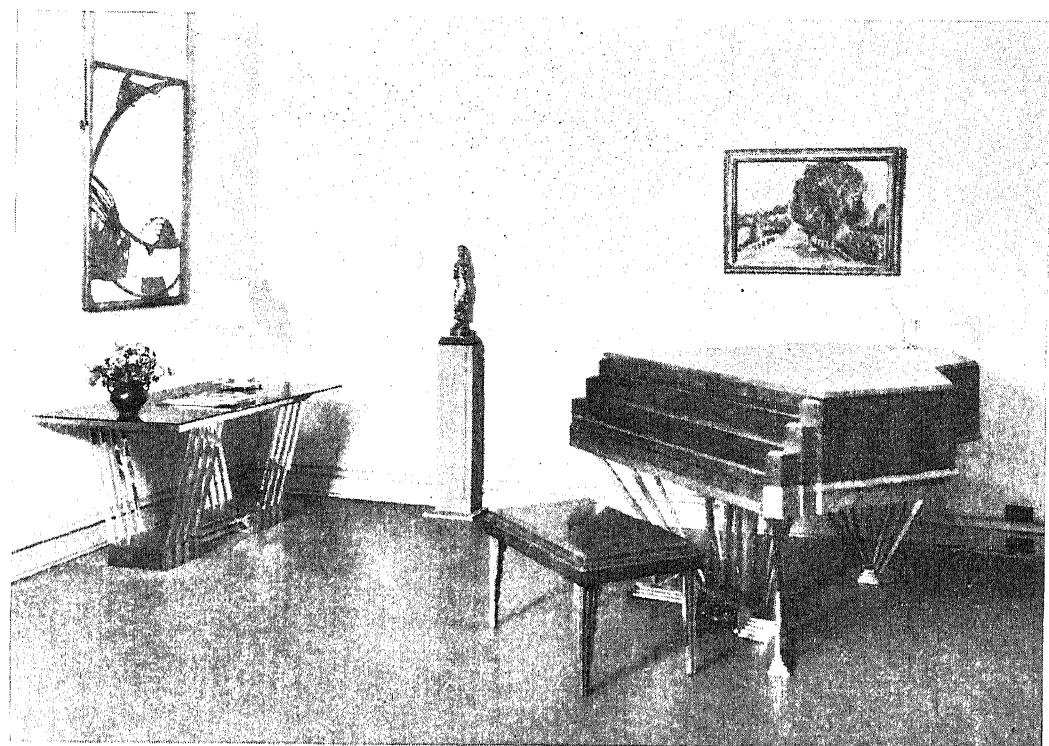


Photo: Newark Museum, Newark, N. J.

## ALL OF THE FURNITURE IN THE ROOM IS OF METAL

This group was assembled for exhibition purposes. Such furniture is so expensive that the manufacturers do not look for it to become popular.

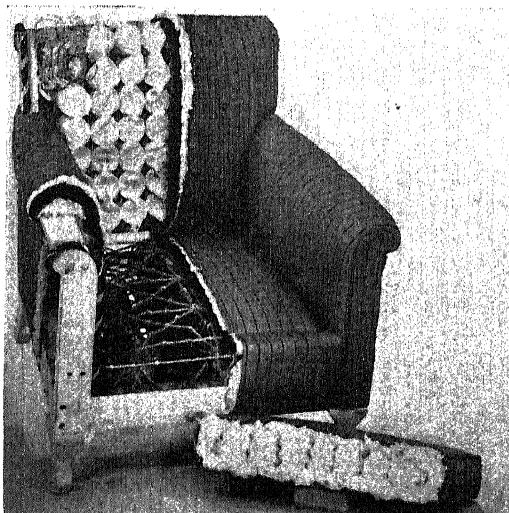
tations of "period" furniture to conform to the ideals of utility, comfort, and beauty are generally in demand to-day. Simplicity is the

now favored. The popularity of antique furniture also has done much to establish these designs. "Overstuffed" furniture, which reached the peak of its vogue shortly after the World War, is being modified, for it is obviously too bulky in appearance to suit the room of average size. The practice of filling the house with useless bric-a-brac, wholly unattractive pictures and vases, and furniture that is weakly constructed and showily decorated, cannot be too strongly condemned. Plain, well-made, artistic furniture, which can be easily kept in sanitary condition, lends dignity to the home.

*City Tendencies.* The small apartments and small rooms which the increased value of housing space has seemed to necessitate in cities in their turn influence furniture-manufacturing. Examples of this effect may be seen in the various types of beds which may be either folded up as divans or rolled away into a closet when not in use. The tendency to limit space has also resulted in "built-in" furnishings, such as wall book-cases and "efficiency" kitchens, with their conveniences, which are installed when the building is constructed.

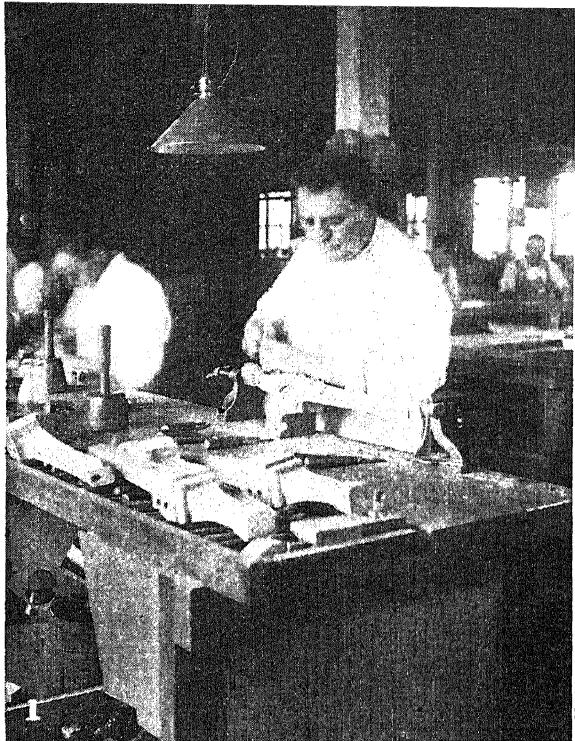
*Popular Woods.* Woods of darker finish are largely supplanting the once popular oak for all house furniture. Walnut is one of the most

(Continued on page 2654.)

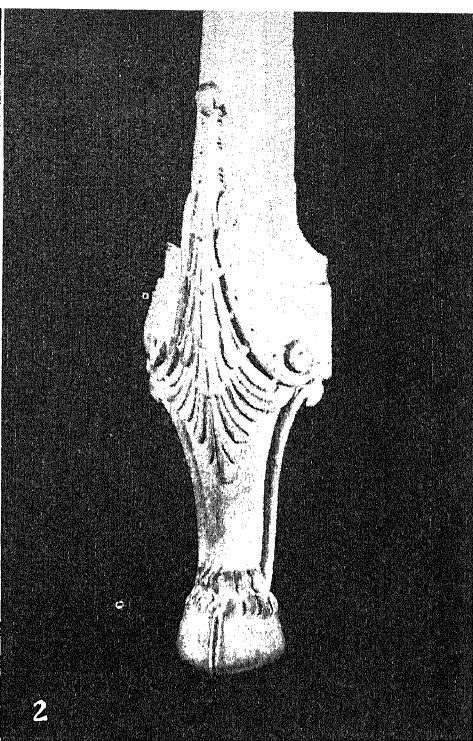


INNER CONSTRUCTION OF AN UPHOLSTERED CHAIR

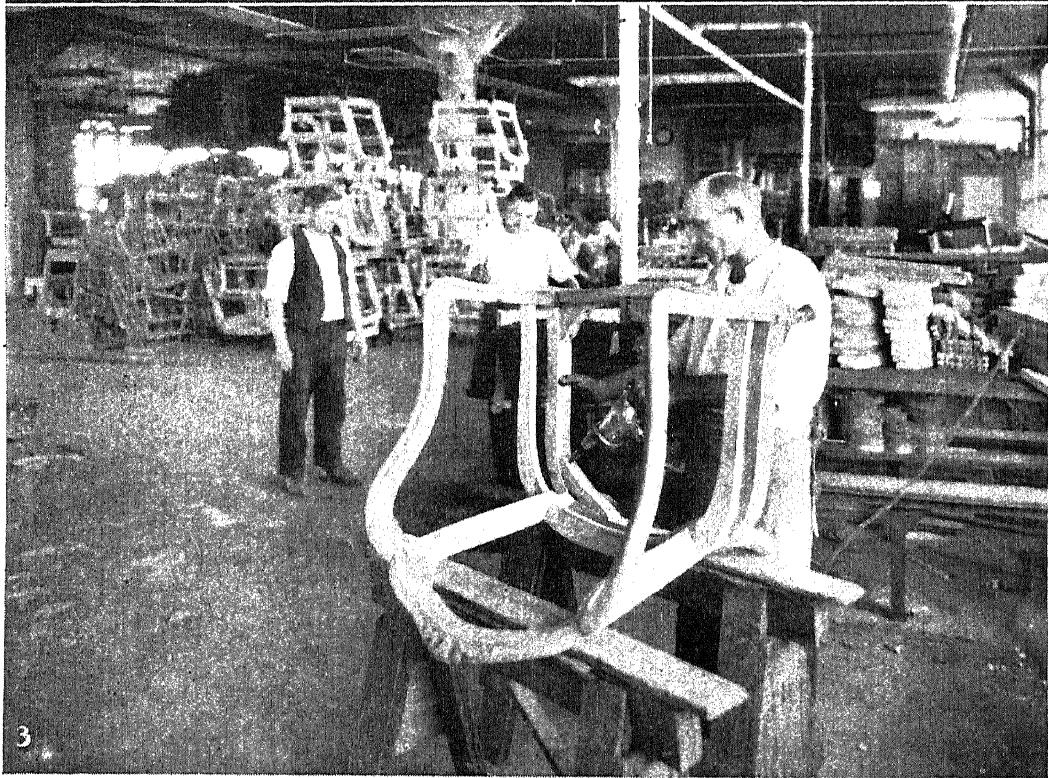
criterion of beauty in the modern home of good taste and moderate means; it is exemplified in the simple "early American" designs which are



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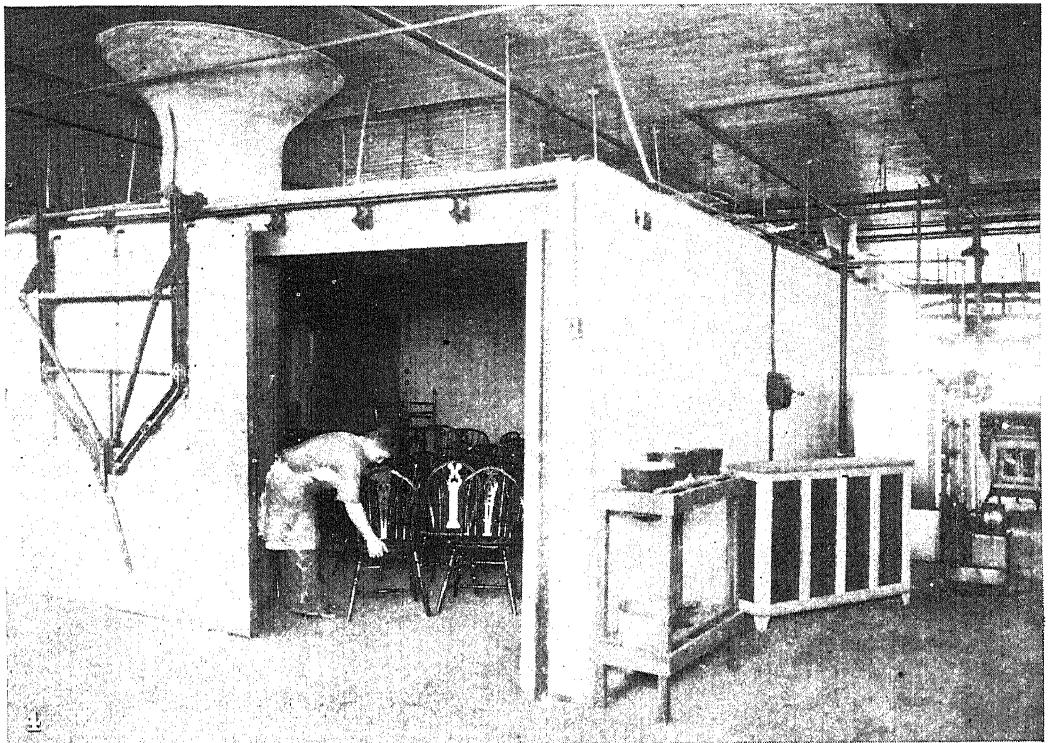


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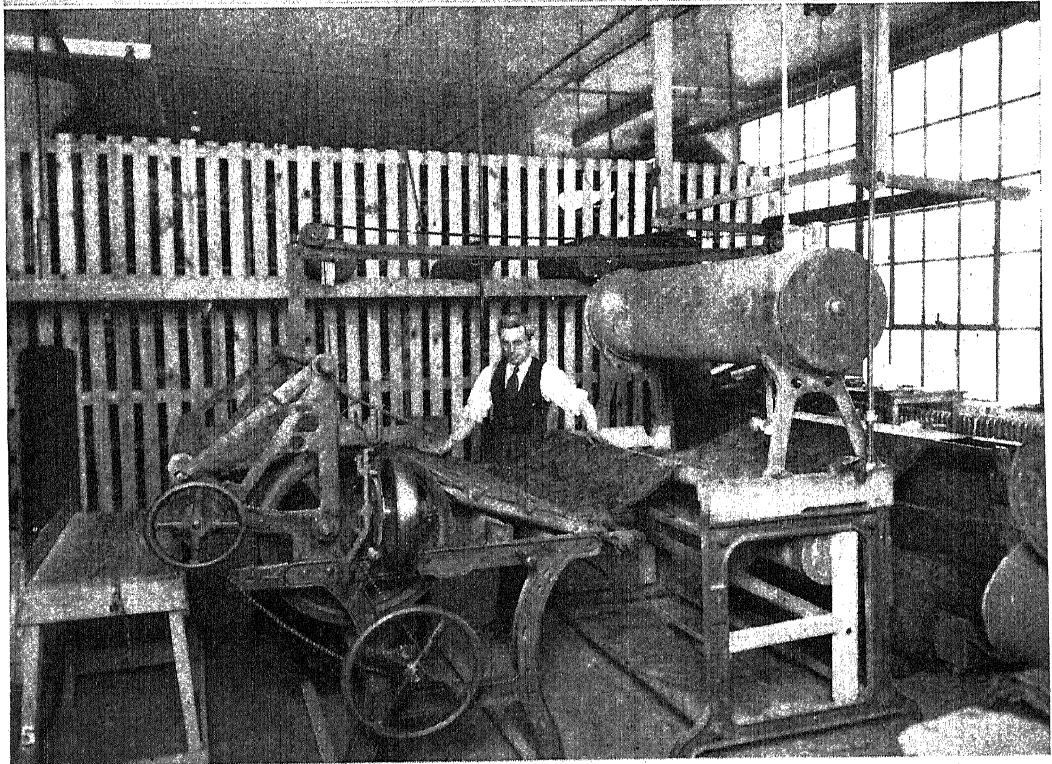


3

**Furniture in the Making.** (1) How hand-carving is done on fine furniture. (2) Close view of the completed carving shown in the first illustration. (3) Putting in a brace to strengthen a chair frame.

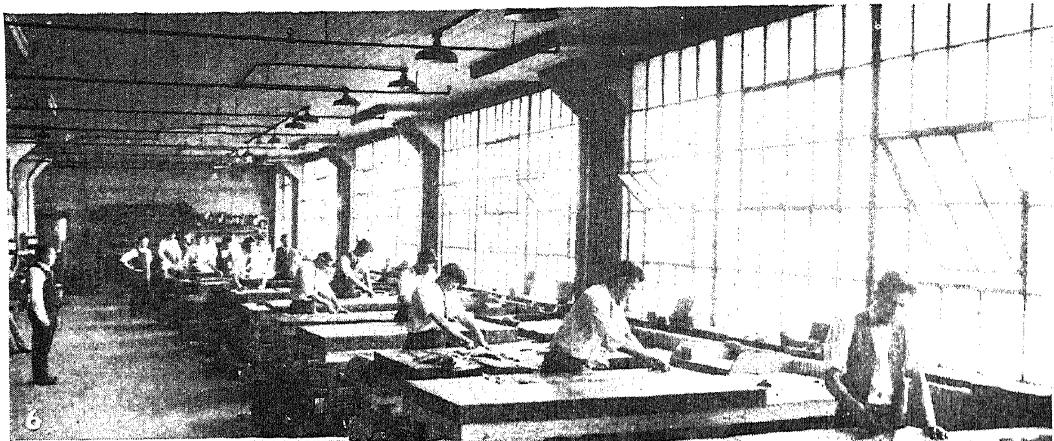


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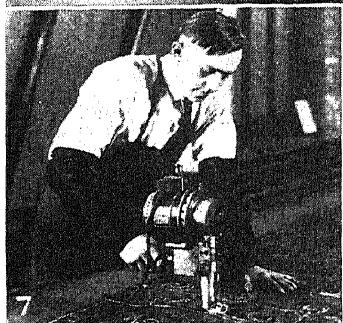


5

Furniture in the Making. (4) The hot-room, where the finishes are dried. Regulation of temperature is imperative, so there will not be blistering or under-drying. (5) Inspecting fabrics; every imperfection is marked. The machine measures, sprays, and rerolls. The spray is a moth destroyer.



6

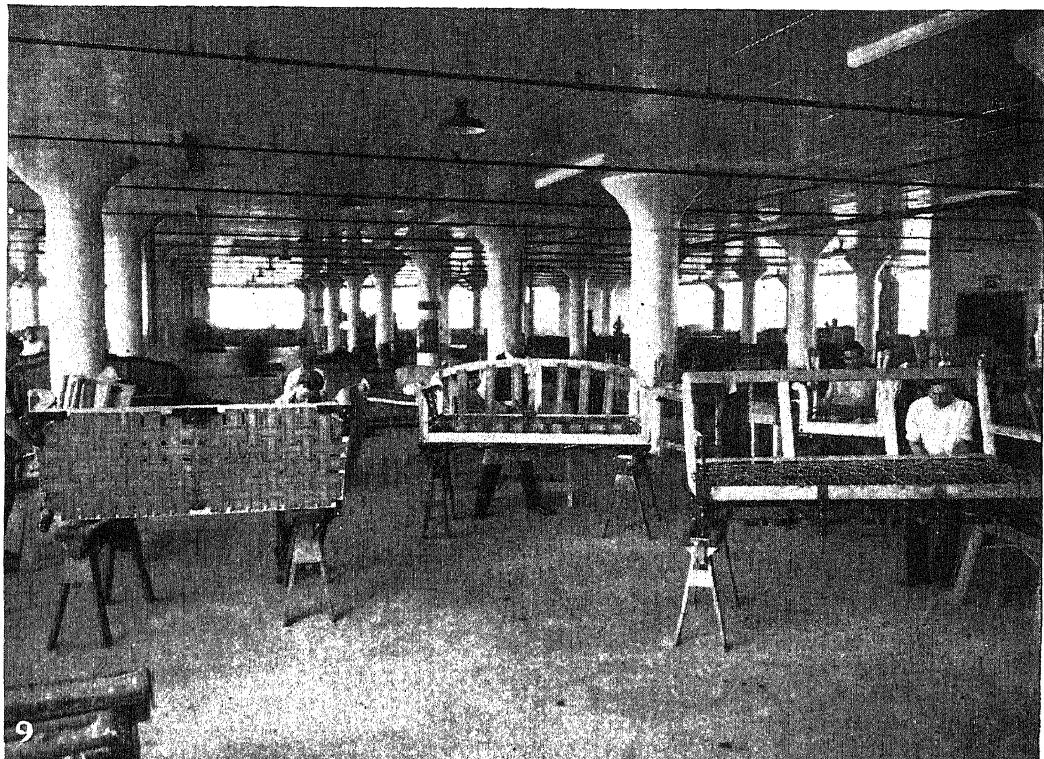


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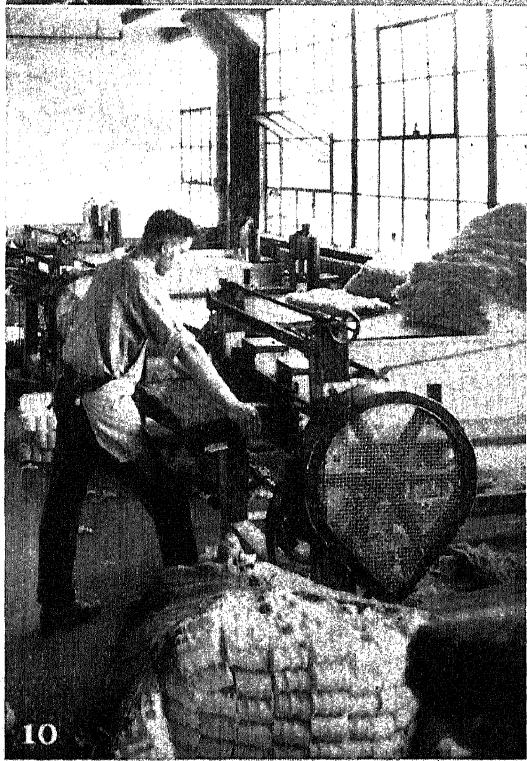


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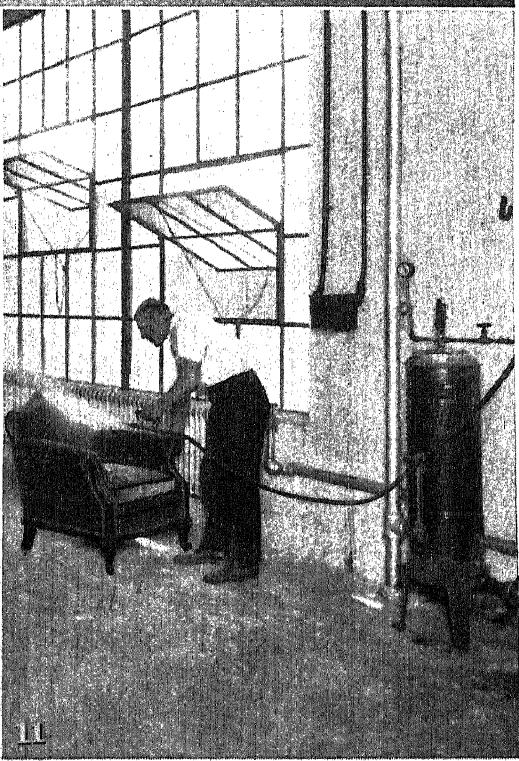
Furniture in the Making. (6) Cutting upholstery fabrics by hand. (7) Cutting several layers of fabrics by machinery, at one operation. (8) In this room the finished frames and cut fabrics meet.



9



10



11

Furniture in the Making. (9) Interlacing webbing in the seat, and tying the springs. (10) Spring cushion-stuffing machine. (11) Dry-steaming mohair, to freshen it and remove marks and creases.

popular cabinet woods, and mahogany, curly birch, and maple are also used extensively. These woods are so expensive that veneering is employed for almost the entire furniture output (see VENEER).

**The American Furniture Industry.** There are in the United States about 3,200 factories for the manufacture of furniture. The three leading states in the industry are, in order, New York, Michigan, and Illinois, the two latter being practically equal in value of products. The chief centers for the manufacture of furniture are New York, Chicago, Grand Rapids (Mich.), Philadelphia, Saint Louis, and Boston. Until about 1900, Grand Rapids was the greatest furniture manufacturing city in the world.

B.M.W.

**FUR'NIVALL, FREDERICK JAMES** (1825-1910), an English philologist and one of the most influential workers in the history of English scholarship. He will be remembered through his success in founding, for the publication of texts, The Early English Text Society, The Chaucer Society, The Ballad Society, The New Shakespeare Society, The Browning Society, The Wycliffe Society, and The Shelley Society. Chiefly through the medium of these societies, he edited numerous manuscripts, including his monumental work—the Six-Text edition of Chaucer's *Canterbury Tales*. He likewise edited a series of forty-three facsimiles of the quartos of Shakespeare's plays, a work which won for him his greatest distinction, from an American standpoint. Dr. Furnivall was born at Egham, in Surrey, and was educated at University College, London, and at Cambridge.

**FUR SEAL.** See **SEAL**, subtitle; **FUR AND FUR TRADE**.

**FUSE, fuze**, an abbreviation of *fusil*, meaning *a gun*, is the name given to many devices used for discharging explosives in guns, shells, and mines. The simplest form of fuse is made of waterproofed jute yarn spun round a core of explosive powder. The explosive is usually of gunpowder, mixed with chemicals to make it burn slowly. One end of the fuse is connected with the charge to be exploded, the other end being ignited. The fuse burns until the sparks reach the charge, when the explosion occurs. Ordinary fuse of the type mentioned above burns at the rate of one foot in half a minute. All blasting operations formerly were thus timed by regulating the length of fuse, but charges are now usually fired by electric fuses. A metal cylinder, containing two copper wires connected by a very fine fusible wire, is filled with explosive and placed in the blasting charge. An electric current is sent through the wires, causing the thin connecting wire to fuse and produce a spark which sets fire to the charge. See **EXPLOSIVES**.

**FUSELAGE, fu' ze lājē.** See **AIRCRAFT** (Table of Aeronautical Terms).

**FUSEL OIL**, sometimes called *potato spirit*, is an impurity in spirits distilled from fermented potatoes, rye, barley, and other vegetable matter. It is a colorless, limpid fluid, with a disagreeable odor. Among other uses, it is valuable in making essential oils and varnishes.

**FUSIBLE METALS.** See **BISMUTHII**.

**FUSING POINT.** See **MELTING POINT; FREEZING**.

**FUST, foost**, a variant of **FAUST**. See **FAUST, JOHANN**.

**FUTURES, DEALING IN.** See **BOARD OF TRADE**.

**FYLES, FRANKLIN.** See **HAIL COLUMBIA**.

**THE WORLD BOOK**  
MODERN ENCYCLOPEDIA PICTORIAL COMPREHENSIVE

# Gg

G is the seventh letter in the English alphabet, and was derived, like almost all the others, from the Phoenician. The name for G in that language was *gimel*, or *gamel*, which meant that most important of all animals at the time, the camel, and the letter itself was at first probably a rude picture of a camel. Later, it was more



and more carelessly drawn, until it looked much like the figure 7, and this symbol the Greeks, who borrowed the letter and saw in it no relation to any animal, turned around (see C). Their *gamma*, like the Phoenician *gamel*, had only the hard sound of G, as in *go*, but the Romans, when they borrowed it, made it stand for that sound and the sound of hard c, as well. The Romans also made it a curved letter, so that it looked like the modern C, and gradually, as they distinguished between the two sounds it bore, they added a little bar below the opening to show that one was G and one was C.

In English, the letter has two distinct sounds, the so-called soft sound, as in *gem*, and the hard, as in *gave*. Most commonly, the hard sound is given before the vowels *a*, *o*, and *u*, as in *gale*, *got*, *gull*, and at the end of a word, as in *big*; the soft sound occurs before *e*, *i*, and *y*, as in *gentle*, *gist*. To this rule there are numerous exceptions.

**GABARDINE**, sometimes spelled *gaberdine*. A wool or cotton fabric resembling ship cord. It may have a worsted, hard, smooth finish, or a dull, soft surface, like woolen. It wears shiny, otherwise has excellent wearing qualities, and is used for dresses and suits. It has a twill weave.

In the Middle Ages, this was a long coat or cloak, worn by Jews. Its origin is uncertain, but *gabardine* was a frock worn by pilgrims. In the *Merchant of Venice*, Shylock says:

You call me Misbeliever, cut-throat dog,  
And spit upon my Jewish gabardine.

**GABBRO**, *gab' roh*. See IGNEOUS ROCKS.

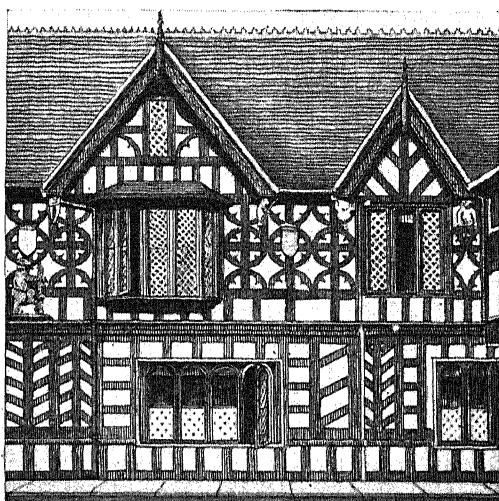
**GABERS**, *ga' burz*, a variant of Ghebers (which see).

**GABES**, *gah' bes*. See TUNISIA.

**GABLE**. When a building has a "peaked" or sloping roof, there is formed at each end a triangle between the eaves and the ridge of the roof. This triangular upper part of the end wall is called a gable—a name which comes from an old Celtic word meaning *fork*. In his poem *Evangeline*, Longfellow writes, in describing the picturesque homes of the Acadian peasants:

Thatched were the roofs, with dormer windows; and  
gables projecting  
Over the basement below protected and shaded the  
doorway

Gables were extremely popular with medieval builders, and in many old European cities—such as Brussels, Bruges, Antwerp, Louvain,



GABLE OF ELIZABETHAN PERIOD

and Nuremberg—the traveler will still see steep-roofed houses and town-halls that were built during the fourteenth and fifteenth cen-



After the painting by Rubens

## THE ANNUNCIATION

The angel Gabriel is the figure at the right.

turies, their quaintly ornamented gables facing the street instead of being at right angles to it, as is the usual custom in our day. In the gables of Holland, Belgium, and Germany especially, square indentations called *corbie steps* were frequently cut into the sides of the triangle, making what is known as a *crow gable* or *stepped gable*.

The use of the gable in American colonial times, and later, is suggested by Hawthorne's famous tale—*The House of the Seven Gables*. In modern American architecture, the popularity of the English style has introduced many

attractive modifications of the gabled roof. See Roofs.

**GABRIEL**, in Bible story, was the favorite of the seven archangels of Jehovah, and the one chosen to carry His messages to mortals. The name, which means *hero of God*, indicates how well fitted this angel was to inspire with courage and faith the person to whom he carried the message. We first hear of Gabriel in the eighth and ninth chapters of *Daniel*, when he interprets the prophet's vision of the ram and the he-goat, and later brings the explanation of the seventy weeks.

In the New Testament, he foretells to Zacharias the birth of John the Baptist, *Luke I*, 19, and to Mary the birth of Christ, *Luke I*, 26.

**The Annunciation.** The announcement of Christ's coming birth to the Virgin Mary by the angel Gabriel has been represented in art by many great masters. These paintings, which bear the name *The Annunciation*, are described in these volumes under that title. One is shown herewith, page 2656.

**GAD**, seventh son of Jacob by the handmaid of Leah, whose name was Zilpah. He was the founder of an Israelitish tribe, which at the exodus from Egypt consisted of over forty thousand fighting men. Gilead, a mountainous district, was the territory of this tribe.

**GADFLY.** See HORSE FLY.

**GADOLINIUM.** See CHEMISTRY (The Elements).

**GADSDEN, ALA.** See ALABAMA (back of map).

**GADSDEN PURCHASE.** On June 30, 1854, a treaty of sale was ratified, wherein the United States purchased land, south of the Gila River in Arizona and in New Mexico, from Mexico for \$10,000,000. James Gadsden, United States minister to Mexico, conducted



THE GADSDEN PURCHASE

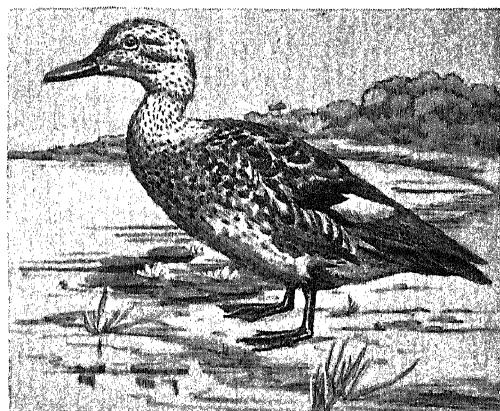
the treaty negotiations with Santa Anna, and the sale met with so much opposition in Mexico that Santa Anna was banished from his country the following year. The purchase was made to settle a dispute over the boundary line between Mexico and the United States, growing out of the treaty which closed the Mexican War, and by it the latter country acquired 45,535 square miles of territory. See MEXICAN WAR.

**GADSHILL.** See DICKENS, CHARLES.

**GADSKI, gaht' ske, JOHANNA W. TAUSCHER** (1871- ), a German soprano, whose powerful voice and wonderful dramatic ability won her fame in many Wagnerian rôles. She was born and educated in Prussia, and after making her début in Berlin at the age of seventeen, as Undine in Lortzing's opera of that name, she was engaged there to sing during each season for the next four years. In 1892 she married H. Tauscher, an officer in the Austrian army, but continued her public work.

After touring in Holland and Germany, she made a brilliantly successful début in *Lohengrin* at the New York Metropolitan Opera House in 1895, under Walter Damrosch. In 1898 she joined the Metropolitan Opera Company, and subsequently sang in nearly every large city in Europe and America. Her deep, rich voice and commanding presence, as well as her power to enter into the personality of the character she portrayed, invariably thrilled her audiences.

**GADWALL, OR GRAY DUCK,** a favorite game bird of the northern hemisphere, much esteemed for the table. It is black and white, marked with brown, and is from twenty to twenty-two inches long, being slightly smaller than the mallard, which it resembles in voice and habits. Shy and fearful of enemies, it sleeps in the grasses of shallow lakes and ponds in midday, and feeds during morning and evening twilight on grains and small water animals. In its grassy nest it lays eight to twelve creamy-white eggs. In America, the gadwall breeds from Southern British Columbia,



THE GADWALL

Central Alberta, and Western Manitoba south to states north of Kentucky, migrating in winter to the Gulf states. To sportsmen of the Atlantic coast, this bird is practically unknown. See DUCK.

D.L.

**Scientific Name.** The gadwall belongs to the family Anatidae. It is known scientifically as *Chenonetta streperus*.

**GAEA**, *je' ah*, the mythological name of the Earth. See GEOLOGY (Nature and Scope); MYTHOLOGY; HESPERIDES; URANUS.

**GAEL**, *gale*, the name of that branch of the Celtic race inhabiting the Highlands of Scotland, Ireland, and the Isle of Man. The Highlanders of Scotland call themselves the Gaels of Albion, while the Celts of Ireland style themselves the Gaels of Erin. The term *Gaelic* is applied by some to the Irish language in general, but by others is restricted to the Celtic dialect spoken in the Highlands. See CELTS.

**GAELIC**, *gale' ik*. See CELTS; GAEL.

**GAELIC LANGUAGE**. The ancient tribes which spoke this language were known as Scoti, and by that name the Romans knew them. The language includes the Irish, Manx, and Scottish Gaelic. The principal home of the Gaelic people was in Ireland, where, at the beginning of the sixth century, a new colony of these Scots settled. These were followed sixty years later by Columba's mission to Iona. Later, the term *Scot* was applied to Teutonic tribes in Scotland, and it became customary to speak of their language, Gaelic, as Irish. The Scots now differentiate Gaelic as Scottish, Irish, or Manx Gaelic.

Gaelic was spoken in Galloway in Queen Mary's reign, and there are districts that never abandoned the tongue. Ireland and Gaelic Scotland were one for some three hundred years, but Scotland was influenced by Norse and Pictish influences, which were felt in the language. The difference is more a variation of dialect than anything else. Gaelic has adopted the Roman alphabet, but the old Irish has its own characters. There is considerable difference between written and spoken Gaelic, which Highland authors have endeavored to overcome. Both Scottish and Irish Gaelic have borrowed heavily from the Latin and English, Scottish Gaelic tending to throw the accent as far back as possible, the Irish stressing the root syllable of the word.

**Gaelic Literature**. Prior to the tenth century, only about a dozen Gaelic books appeared in the British Isles, although two hundred manuscripts of this period have been preserved on the continent. Adamnan's *Life of Columba* was written in Iona before A.D. 713; *The Book of Deer*, a manuscript of the ninth century, is in Cambridge, England. The subject matter of many of the Gaelic manuscripts is of a religious nature, such as the lives of the saints. Gaelic poetry is all lyric, with smooth, flowing lines. The language is exaggerated, and frequently inflated, and in Scottish Gaelic, witty. In the latter, there is evidence of a lack of annals, two folios of Irish events (1360-1402) and the history of the Macdonalds being about all of an historical nature that is represented. One-third of the Scottish collection is

medical. The first book printed in a Gaelic dialect was John Knox's *Liturgy*, translated and published in 1567. Up to the eighteenth century not more than twenty books were published in Gaelic; there are now hundreds. A Gaelic vocabulary was published in 1741. From that date to the present, there has been a very considerable production of literature in Gaelic. Due to the influence of the Gaelic League, there are a number of newspapers in Ireland now being published in Gaelic.

**GAGE, THOMAS** (1721-1787), an English general who became famous as the colonial military governor of Massachusetts. Under his command, the Revolutionary War was begun.

He received a lieutenant's commission in the English army in 1741, and accompanied Braddock to America in 1754. Gage was with that general when he marched his army through the wilderness as though he were on a parade ground, and was ambushed by the Indians. He raised a regiment of troops in 1758, and commanded it in the Ticonderoga siege under Amherst, who made him governor of Montreal in 1760. From 1763 to 1772, he was chief of the English forces in America, but later returned to England.

In 1768 General Gage was ordered to return to Boston for stricter enforcement of the Boston Port Bill and the Stamp Act, as King George had found that money was not coming in fast enough for the support of his army in America. He found the Bostonians undaunted. His troops took delight even in demolishing the snow forts and skating places of the small boys of the town. When the patience of the latter was exhausted, they called in a body on the general and demanded that he make his soldiers let their playgrounds alone. He complied with their request, adding, "Even the children make demands for their rights." The first battle of the Revolution was fought through his order to seize the military stores at Concord, and when, after the Battle of Bunker Hill in 1775, the British were nearly defeated, Gage was recalled and Howe was assigned to his command.

**Related Subjects.** The reader is referred in these volumes to the following articles:

Boston Port Bill  
Howe (Sir William)

Revolutionary War  
Stamp Act

**GAILLARD CUT.** See PANAMA CANAL.

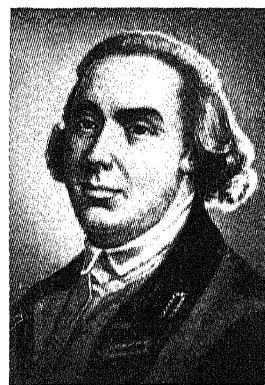


Photo: Brown Bros.

GENERAL GAGE

**GAINESVILLE**, Fla. See FLORIDA (back of map); FLORIDA (Education).

**GAINSBOROUGH**, *gaynz' b'roh*, THOMAS (1727-1788), an eminent English painter, one of the foremost in portraiture, and almost equally distinguished as a landscapist. The son of middle-class parents of Sudbury, Suffolk, he early disclosed remarkable artistic talent, and was sent to London to study painting at the age of fifteen.

About three years later, he returned to Sudbury, where, at the age of twenty, he married a Miss Margaret Burr, a sweet-tempered lady, who was destined to be a good influence in his life. Assured of com-

fort through Mrs. Gainsborough's dowry, the young people settled in Ipswich. Here, for fourteen years, Gainsborough painted steadily; landscapes chiefly, portraits when he had sitters. In 1760 he removed to Bath, where he soon was receiving orders for portraits from the most fashionable people of the place. Prosperity and a reputation now were his, and in London, where he resided from 1774, he had as sitters George III and the queen, as well as famous beauties of society and the theater. He died of cancer at the height of his career. Gainsborough was elected one of the original members of the Royal Academy, but never exhibited there after 1784, because he



Photo: Brown Bros.

THOMAS GAINSBOROUGH  
From the painting by himself.



THE FAMOUS SIDDONS PORTRAIT

This is a typical example of Gainsborough's art. It hangs in the National Gallery, London.

was dissatisfied with the location assigned some of his portraits in the exhibition of that year.

**Summary of His Work.** As a portrait painter, Gainsborough was distinguished for his ability to create a truthful likeness, both of form and of personality. His color is fresh and cool, and his portraits have a nobility and grace that charm. Of the more than 200 that he painted, the best include *Mrs. Siddons*, London National Gallery; *Perdita Robinson*, Wallace Collection; *Mrs. Graham*, Edinburgh National Gallery; the *Blue Boy*, purchased in 1928 by an American for \$800,000, and placed in the Huntington collection in California; and *Georgiana, Duchess of Devonshire*, Morgan Collection, Metropolitan Museum. His landscapes, masterly examples of the naturalistic method, are always touched with melancholy. *Wagon and Horses Passing a Brook*, in the National Gallery, London, is a characteristic example.

**GAIUS PLINIUS.** See PLINY (The Elder).

**GALAHAD**, SIR. In the legends of King Arthur, Sir Galahad was the noblest of the Knights of the Round Table, and the one who had the most important part in the quest for the sacred cup from which Christ drank at the Last Supper. This knight is pictured in

art, narrative, and poetry as the type of ideal manhood, set apart from other men because of his wonderful strength and purity. This conception finds appropriate expression in the familiar lines from Tennyson's *Sir Galahad*:

My good blade carves the casques of men,  
My tough lance thrusteth sure,  
My strength is as the strength of ten  
Because my heart is pure.

The different versions of the Sir Galahad legend vary in many details. He is represented as the son of Sir Lancelot and Elaine, and as created by enchantment. In the stories of Sir Thomas Malory, Sir Galahad, Sir Bors, and Sir Percival are permitted to see the Holy Grail, after which the soul of Sir Galahad

departs to heaven. "Then it seemed to the two knights that there came a hand from heaven and bore away the holy vessel. And since that time, there was never any man so bold as to say he had seen the Holy Grail."

In Tennyson's *Idylls of the King*, Sir Galahad, on the last day of his quest, saw rising up before him, and stretching out toward a great sea, a bridge of a thousand piers, each of which, as he crossed, became a sweeping mass of flame. When he had passed far out on the great sea, he was drawn into a celestial city whose spires and gateways gleamed white like pearls, and over which, in a mist of wondrous beauty, floated the Holy Grail.

**Related Subjects.**  
The reader is referred in these volumes to the following articles:

Holy Grail  
Idylls of the King  
Lancelot  
Malory, Sir Thomas  
Parsifal  
Round Table

**GALAPAGOS, gah lah' pah gos, ISLANDS.** Called the strangest islands in the world, these are a region on which man is almost unknown, and where reptiles of great size have survived. The

Galapagos lie in the Pacific Ocean, directly across the equator, 600 miles west of Ecuador, to which they belong. Officially, the islands are now called Colon. See ECUADOR.

In the early days, they were known as the Enchanted Isles. Buccaneers buried their booty there; whalers passed them; castaways found them a refuge; mutineers were left there

to languish. Robinson Crusoe (Alexander Selkirk) visited them after his rescue from Juan Fernandez. A wealth of Old-World romance clings to them, but life to the few residents is calm.

The islands are little more than volcanic peaks. They are the abode of the rare, flightless cormorant, the penguin (popularly believed to inhabit only south-polar regions), variations of the mocking bird elsewhere unknown, herons, and boobies. Great turtles weighing 500 pounds yet exist, and the Spanish word for them (galapagos) gave the islands their name. There are hosts of scarlet crabs, identical with Atlantic species from which they have been separated for possibly 35,000,000 years. Most fantastic of all are thousands of iguanas, many of them four feet in length. These animals are not afraid of man; visiting scientists have handled those not repulsive, such as baby seals and penguins, while the parents looked on without concern.

In 1858 these islands were explored by Charles

Robert Darwin (which see) during the voyage of the *Beagle*, and they figure largely in his writings on the evolution of animals (see EVOLUTION). For the reasons named above, the group has always been interesting.

One island is sparsely settled (500 population); it has a resident governor and a wireless station.



SIR GALAHAD

Reproduced from the painting by Watts. Ellen Terry, the actress, while the wife of Watts, was the model for the Galahad of the picture.

**GALATA**, *gah' lah tah*. See CONSTANTINOPLE.

**GALATEA**, *gal a te' ah*, the sea nymph of classic mythology, the daughter of Nereus and Doris, often called the *queen of the sea*. Ugly, one-eyed Polyphemus loved her, but she gave herself to the Sicilian shepherd, Acis. Enraged at this, the monster, surprising them one day, crushed Acis beneath a rock, whereupon he was changed into a stream that flowed to sea to meet the beloved Galatea. The story of another Galatea is told under the title PYGMALION.

**In Music and Art.** The story of Galatea inspired Raphael's fresco, *The Triumph of Galatea*, in the Villa Farnesina at Rome, Handel's melodious secular oratorio, *Acis and Galatea*, and works of less noted poets and sculptors.

**GALATIA**, *ga la' shi ah*. In 277 B.C. Nicomedes, king of Bithynia, invited three tribes of Gauls to aid him in conquering his brother.

After accomplishing this feat, the Gauls settled in Central Asia Minor (which see), the territory receiving the name Galatia from them. The boundaries are shown on the map. The Gauls shunned the cities as places of residence and occupied the country, but they exacted tribute from the inhabitants of the cities. In 189 B.C. the Roman consul, assisted by Eumenes, king of Pergamum, partially conquered them, but in 26 B.C. Augustus made their country a Roman province. The apostle Paul visited Galatia twice (*Acts xvi, 6; xviii, 23*) and later wrote a letter to the people of the country, known as Paul's *Epistle to the Galatians*.

**Epistle to the Galatians.** When the Apostle Paul heard that the Jews had tried to make the Galatians think that he was not an apostle of God with a divine message, he wrote a letter to them. It will be known as long as the world stands as the *Epistle to the Galatians*, and is the ninth book of the New Testament. After expressing surprise that the people have so soon abandoned him and the Gospel, Paul defends himself against unjust criticism and warns them against those who wish them to keep the Law of Moses. He tells them to be kind to those who have done wrong and to help each other, guiding and encouraging them to follow Christ and His teachings.

**GALAXY**, *gal' ak sie*. See MILKY WAY; STAR (Stars in Space).

**GALBA**, SERVIUS SULPICIUS (3 B.C.-A.D. 69), was a Roman emperor who came of a noble

and wealthy family, and in his early years gave promise of remarkable ability. As general in Germany and proconsul to Africa, he conducted successful campaigns which brought him triumphal honors. He then retired from public life until A.D. 61, when Nero appointed him general in Spain. There he incurred the displeasure of the emperor, who secretly ordered him to be assassinated. Hearing of this, Galba revolted, and on the death of Nero, in A.D. 68, assumed the title of Caesar and hastened to Rome. His reign was short, as he soon became unpopular because of his weakness and miserly ways; in an attempt to quell a revolt, he was attacked and slain. See NERO; TRIUMPH.

**GALDHÖPIGGEN.** See NORWAY.

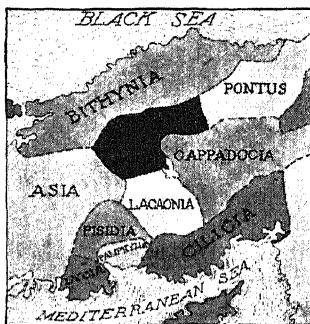
**GALE**, LEONARD. See MORSE, SAMUEL F. B.

**GALE**, ZONA (1874- ), since June, 1928, MRS. W. L. BREESE, an American novelist skilled in the delineation of special types of character. She was born in Portage, Wis.

After her graduation from the state university, in 1895, she began newspaper work in Milwaukee, and from 1901 to 1904 was a reporter for the *New York World*. In the midst of her arduous and varied duties, she found time to write poems and short stories, proving herself an author of outstanding merit. In 1904 she returned to Portage, there to reside with her mother until her marriage. Miss Gale is keenly interested in Wisconsin politics. She became a member of the Board of Regents of the university, actively promoted the Presidential campaign of the late Senator LaFollette, and is an enthusiastic supporter of his principles.

In Miss Gale's earlier stories she exhibits sentimentality and verboseness, and it is interesting to trace her progress from this vein to her later extreme condensation, notable in *Miss Lulu Bett*, and especially in *Faint Perfume*. In the latter, there are chapters that are hardly more than outlines, giving one the impression of a cameo-like clarity and perfection.

**Her Principal Works.** The dramatization of *Miss Lulu Bett* won the Pulitzer prize of 1921, and *Mister Pitt*, the dramatization of her lengthy novel *Birth, Friendship, Village Stories, Mothers to Men, Preface to a Life*, and *Borgia*. She contributes to magazines, and has syndicated her "storilettes" in the news-



LOCATION MAP



Photo: U & U

ZONA GALE

papers. A collection of short stories entitled *Yellow Gentians and Blue* was published in 1927.

**GALEN, OR GALENUS, CLAUDIUS** (A.D. 130-200), a celebrated Greek physician and the most versatile writer of his day on medical subjects. He is said to have written 500 treatises on medicine, logic, grammar, and ethics. Only eighty-three of those attributed to him are now acknowledged as genuine; some of the remainder are doubtful, and others are obviously spurious. Galen was so successful as a physician that he earned the name of *wonder worker*. He was appointed physician to the Emperor Marcus Aurelius, and, later, to his son and successor, Commodus. Until the sixteenth century, he was regarded as the highest authority on matters relating to anatomy and physiology.

**GALENA, OR LEAD GLANCE**, the most important ore of lead. It is a sulphide of lead, containing, when pure, about 86.6 parts of lead to 13.4 parts of sulphur by weight. Galena is a heavy, brittle, lead-gray mineral with a metallic luster. It is abundantly distributed in beds and in veins, and is found in fibrous, granular, and crystalline forms. The chief galena localities include Mexico, Spain, Canada, the Harz Mountains (Germany), Missouri, Utah, Idaho, Oklahoma, Colorado, and Montana. In Canada it is mined in British Columbia and Ontario. Galena containing a considerable proportion of silver is known as *argentiferous galena*, and is sometimes worked for this metal. Coarsely grained galena, used for glazing pottery, is known as *potters' ore*. See LEAD.

A.N.W.

**Chemical Formula.** The formula for galena is PbS; that is, a molecule contains one atom each of lead (in Latin, *plumbum*) and sulphur.

**GALERIUS.** See DIOCLETIAN.

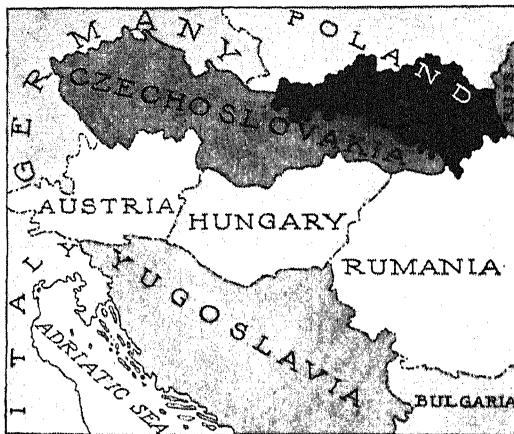
**GALESBURG, ILL.** See ILLINOIS (back of map).

**GALICIA, gah lish' ih ah**, the southern district of Poland, formerly an Austrian crownland. It covers about 30,000 square miles, and extends along the northern slopes of the Carpathian Mountains and down through the foothills to the broad valleys of the Dniester and the Vistula rivers; to the east lies the Russian Ukraine, and to the south and west are Rumania and Czechoslovakia.

The country is drained by the Pruth, San, Dunajec, and Bug rivers, as well as by the Vistula and Dniester, and is noted for its numerous mineral springs. The climate is severe, the short summer being intensely hot and the cold of winter very penetrating. Lemberg, the former capital, and Cracow are the principal cities of the province. See POLAND (Cities).

Of the districts of Poland which have been restored, that of Austrian Poland, or Galicia,

is probably the least advanced agriculturally. The flocks and herds and lands were ravaged by the fierce battles which raged across the district during the World War, and the people are handicapped by extreme poverty. Hay, wheat, maize, potatoes, and sugar beets are important crops. There is a beginning of



LOCATION OF GALICIA

manufacturing in the district's woolen mills, and the country has abundant timber resources.

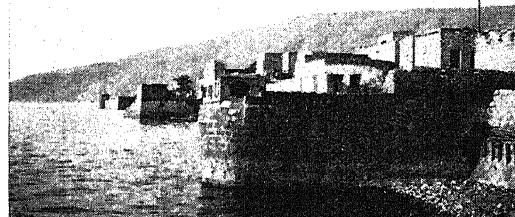
Salt, coal, and petroleum are the chief mineral products; some of the richest petroleum fields in Europe are found in the Carpathian range, although the output is less than that before the war. The rock-salt deposits of Wieliczka are famous.

**History.** Galicia was a part of Poland until the first partition of the country, in 1772, when it became a possession of Austria. During the World War, it was the scene of terrible fighting between the Russian and Austro-German armies. Though overrun by the Russians and held by them until the spring of 1915, the crownland was reconquered by the opposing forces in their spectacular drive toward Warsaw. One of the outstanding features of this campaign was the assault on the fortified town of Przemysl, which surrendered to the Russians in March, 1915, after a siege of 185 days, and was recaptured by the Austro-German armies the following June. Lemberg (also called Lwow), was another center of desperate fighting.

After the collapse of the Dual Monarchy of Austria-Hungary, the future of Galicia was a source of continued dispute. According to population, the province is divided naturally into two parts. West Galicia is inhabited by a majority of Poles and was assigned to Poland in 1919 by the League of Nations. East of Przemysl, a large proportion of the people were Ruthenes (Ukrainians), and thus racially related to the people of Russian Ukraine.

Ruthenians (from both Galicia and Russia) and Poles disputed the territory of Eastern Galicia violently, and Poland at last occupied the district and treated it as far as possible as an integral part of its country. Finally, in 1923, it was given to Poland by the allied and associated powers, after it had been occu-

the east and the Mediterranean Sea on the west. It is now included in Syria, liberated after the World War from Turkish misgovernment (see SYRIA). It has a worldwide religious interest, which it will never lose, for Nazareth, Cana, Nain, and others of its cities were the scenes of many important events during Christ's ministry on earth. The inhabitants of this locality, on account of their ignorance, peculiar dialect, and rather lax religious senti-



Photos: Canadian Pacific; O R O C

#### VIEWS OF TIBERIAS, ON THE SEA OF GALILEE

In the upper picture are shown ruins of the old Roman walls, jutting into the sea.

pied by Poland for four years, in accordance with an earlier decision of the same group.

At first, absorbed in their hard-won nationality, the Poles did not observe the rights of national minorities within their country. As reconstruction and organization progressed, however, a voice in the government and provisions for the use of their own language in schools and courts were promised the still rebellious Ruthenians.

[A further study of Galicia, including its people and resources, may be made by reference in these volumes to the article POLAND.]

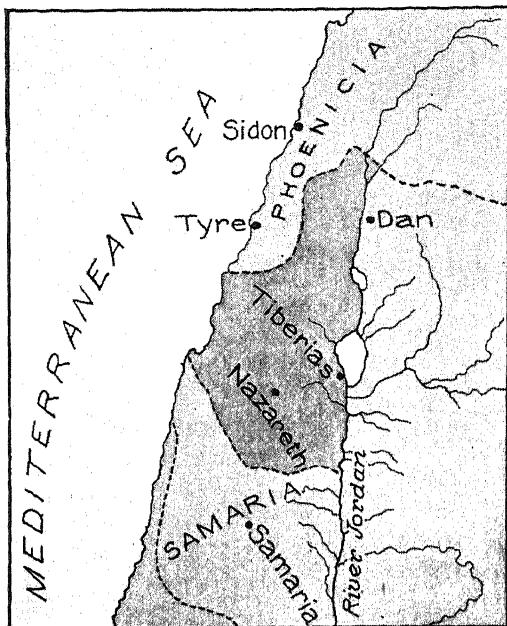
**GALILEE.** At the beginning of the Christian Era, Galilee was the most northern division of Palestine, lying between the River Jordan on

ments, were scorned by the ancient Jews, who, in derision, referred to the Christians as "Galileans." After the destruction of Jerusalem, however, the formerly despised region harbored many Jewish refugees, and became the center of a number of schools for the education of rabbis.

**Sea of Galilee**, in Biblical history also called the LAKE OF GENNESARET and the SEA OF TIBERIAS, is an oval-shaped body of water in the north of Palestine. Through it flows the River Jordan. No other sea or lake in all history has held for so many hundreds of years the reverent attention of the Christian world, for it was intimately associated with the lives of Christ and His disciples.

The sea is nineteen miles long by six miles broad, and is supposed to have been formed by volcanic

forces. Once there were nine flourishing cities on its shores, and it was the center of an extensive fishing industry, but its vicinity is barren and practically



LOCATION MAP

Galilee is represented in the darkest color on the map.

deserted. Only two of the towns which flourished in Bible times yet survive—Magdala and Tiberias—but these are now almost in ruins.

**GALILEO**, *gal ih le'o* (1564-1642), one of the first scientific astronomers, was born at Pisa, and as a youth began to study medicine and the principles of Aristotle's philosophy in the university of that city. Galileo, the name which he bears by virtue of custom, is a shortened form of his real name, **GALILEO GALILEI**, which he did not like. Not content to follow the beaten path of learning, at the age of eighteen he made an important discovery quite outside his regular course of study. The great lamp hanging from the roof of the cathedral at Pisa was one day accidentally set in motion, and as Galileo watched it swinging to and fro, he was so impressed by the regularity of its movements that he conceived the idea of a simple pendulum used for the measurement of time. This discovery he turned to good

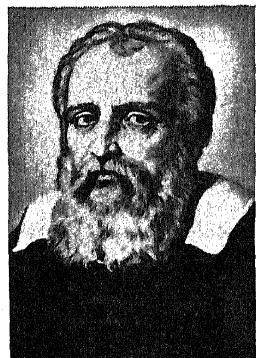
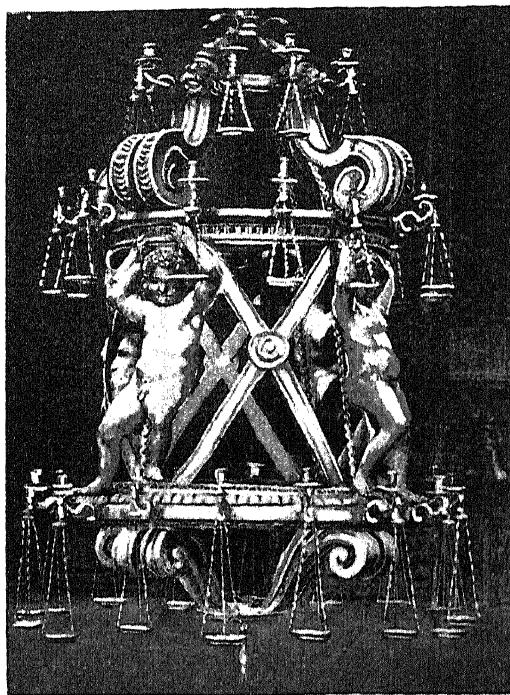


Photo: Brown Bros.

GALILEO

account years later in the construction of a clock for astronomical purposes.

About the same time, he abandoned the study of medicine for that of mathematics, a subject which opened up to him a new field of research that gave him untold delight. Though for lack of funds he was obliged to leave the university in 1585, he continued his mathematical studies in private, the first results of his investigations being his invention of a balance for weighing substances in water.



THE GALILEO CHANDELIER

This lamp, suspended from the ceiling of the Pisa cathedral, gave the great astronomer the idea of the laws of the pendulum.

By 1589 his achievements had won him such renown that he was appointed professor of mathematics in the University of Pisa, where he remained for two years. During this period, he discovered the law that all falling bodies, regardless of their weight, travel through air with the same rate of speed. Galileo proved the truth of his theory by dropping balls of different weights from the leaning Tower of Pisa, but his success only brought him into disfavor with the followers of Aristotle, whose faces were turned toward the past, and he found it advisable to resign his professorship in 1591.

The following year he accepted an invitation to lecture on mathematics in the University of Padua, and there he remained for eighteen years. His sojourn at Padua was a period of

triumph and prosperity, and students from all parts of Europe came in vast numbers to hear his lectures. He was then at the height of his creative powers. In 1597 he invented the sector, a form of compass still used in geometrical drawing, and about the same time he constructed the first thermometer. Though he was not the actual inventor of the telescope, he was the first to make extended and practical use of it, and when in 1609 he began to sweep the starry heavens with an instrument of his own making, he opened up a wonderful era in modern astronomy.

He discovered that the moon was not a smooth sphere shining by its own light, but that its surface was marked by valleys and mountains, and that it gave out only the light which it reflected. Brushing aside the fables and superstitious tales concerning the nature of the Milky Way, he declared that it was a great field of myriad individual stars. In 1610 he made his crowning discovery of the four satellites of Jupiter, which he named the Medicean stars. In the same year, he observed the peculiar form of Saturn, the rings of which were recognized several years later. He also detected the movable spots on the sun, inferring from their regular advance from east to west the rotation on its axis and the inclination of that axis to the plane of the ecliptic.

In 1610 Galileo was invited by his friend and patron, the Grand Duke of Tuscany, to establish himself at Florence as his official mathematician and philosopher, and soon after he made observations of the phases of Mercury, Venus, and Mars. The following year he visited Rome, where he was received with high honors, but he was then just entering upon a period of discord and disappointment. His publication of a treatise on the sun's spots, in which he openly stated his belief in the theory of Copernicus (see COPERNICUS, NICHOLAS), that the earth moves around the sun, brought him into trouble with the Church authorities, and in 1632 the appearance of his great masterpiece, *A Dialogue Concerning the Two*

*Great Systems of the World*, caused him to be summoned before the Holy Office (see INQUISITION).

After a long trial, he was ordered to renounce his scientific theory, and was sentenced to an indefinite term of imprisonment. The sentence was not strictly enforced, however, as he was given permission to reside first at Siena, and later at Florence, where he died. His interest in his labors continued to the end, even when, stricken with blindness, he could no longer

look upon the wonders of the earth and sky. He was buried in the Cathedral of Santa Croce, at Florence, where a great monument has been erected in his honor.

Galileo was one of the world's original thinkers, whose investigations and discoveries have made him the creator of experimental science. He was the first to see clearly the unchangeable relation between cause and effect, and his service to the progress of learning is memorable and his

Photo: Visual Education Service

GALILEO EXPOUNDING HIS THEORIES

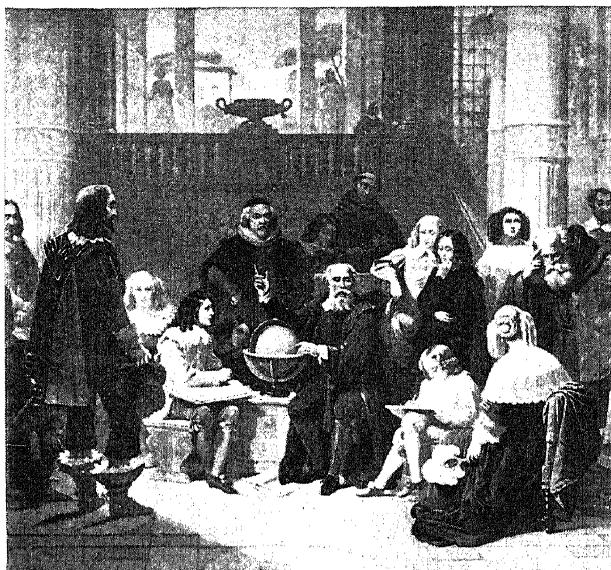
fame will endure to the end of time.

**Related Subjects.** The name of Galileo is forever associated with the following, and the reader is referred to the descriptive articles:

Falling Bodies  
Gravity, Specific

Pendulum  
Telescope

**GALL, gahl, FRANZ JOSEPH** (1758-1828), the founder of the system of phrenology, was born at Tiefenbrunn, Baden, Germany. He studied and practiced medicine in Vienna. Having made an exhaustive study of the structure and functions of the brain, he became convinced that each of the various faculties of the mind has a special seat in the brain, and that the shapes of men's heads determine their mental and moral characteristics (see PHRENOLOGY). In 1796 he began a series of lectures at Vienna, but the ideas he advanced were so contrary to accepted theories concerning the mind that the Austrian government in 1802 forbade his continuing his lectures. In 1807 Professor Gall went to Paris with his pupil and associate, Dr. Spurzheim. There he gained a successful practice and was also active in promulgating his theories. Gall's



system of phrenology at one time had wide acceptance, but modern research has shown that it is physiologically unsound.

**GALLATIN, ALBERT** (1761-1849), an American financier, statesman, and ethnologist, was born in Geneva, Switzerland. In 1780 he emigrated to America and was for a time teacher of French in Harvard College. In 1786 he removed to Fayette County, Pa., became a member of the state legislature, where he was active in opposition to the Federal excise law (see WHISKY INSURRECTION), and was elected to the United States Senate in 1793. However, he was declared ineligible to hold the latter office, it having been less than nine years since he became a naturalized citizen. He served in the House of Representatives from 1795 to 1801, and from that time until 1813 was Secretary of the Treasury, in which post he proved himself an eminent financier.

In negotiations which concluded with the Treaty of Ghent, Gallatin rendered important service and was rewarded by appointment as minister to France, retaining this post from 1816 to 1823. In 1826 he was sent to London as minister, and on his return settled in New York. He became interested in the problems of finance and education, and also took an active part in the founding of the University of New York. He was the first president of the Ethnological Society of America, which was founded through his efforts in 1842.

**As a Writer.** Gallatin wrote several valuable essays on various phases of ethnology. His published works include *Notes on the Semi-Civilized Nations of Mexico, Yucatan and Central America, and The Indian Tribes East of the Rocky Mountains*.

**GALLATIN RIVER**, one of the sources of the Missouri. See MONTANA (Rivers).

**GALL BLADDER**, a small, pear-shaped pouch on the under side of the right lobe of the liver, in which bile is stored. It is about four inches long and two inches in diameter, and can hold about an ounce and a half of fluid. The stem, or neck, of the gall bladder connects with a tube (the *cystic duct*) which enters the *hepatic duct*, the two combining to form the *common bile duct*. When digestion takes place, bile flows from the liver through the hepatic duct into the common duct and empties into the duodenum, the first division of the small intestine; during the interval between meals, this fluid passes into the common bile duct, but is kept out of the intestine by a small

muscle which guards the opening into the duodenum. It therefore flows backward into the cystic duct and from that tube into the gall bladder, where it remains until needed. If the bladder becomes inflamed by disease germs, small hard masses form inside of it. These are the *gall stones* that cause such severe attacks of pain when they pass through the bile duct into the intestine; in many cases, they have to be removed by a surgical operation.

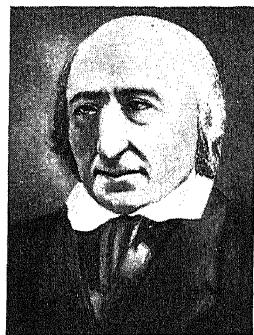
K.A.E.

**Related Subjects.** The reader is referred in these volumes to the following articles:

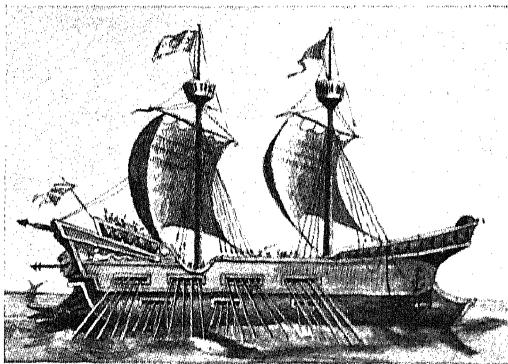
Bile  
Digestion

Intestine  
Liver

**GALLEY**, the old-time ship of the Mediterranean merchantmen, was a long, single, or half-decked vessel with low free-board, propelled principally by oars, but also having masts for sails. The term is generally descriptive of the later Roman and Grecian war-vessels of various types, the motive power of which was the oar, but it more particularly applies to the war craft of the Middle Ages,



ALBERT GALLATIN



A GALLEY

which survived in the Mediterranean navies after the adoption elsewhere of larger ships of war propelled entirely by sails. Ancient Greek vases show many illustrations of the *bireme*, or galley with two rows of oars, whose invention marked an important advance in naval construction; but it was the *trireme*, or galley with three rows of oars, which was the chief battleship of Greece during its period of glory. The number of oars varied, some vessels carrying twenty-five on either side, and others as many as thirty-two. The oars were worked originally by slaves or prisoners of war, and later by condemned criminals. The last great naval battle in which galleys figured was that of Lepanto, in 1571. See TRIREME.

**GALL FLY.** See GALLS, illustration.

**GALLI-CURCI, koor' che, AMELITA** (1889- ), one of the greatest of coloratura sopranos. Her voice has a range of three octaves in perfect purity. Madame Galli-Curci was born in Milan, Italy, of Italian and Spanish

parents. At the Royal Conservatory in that city, she won first honors as a student of the piano. Having discovered that she possessed an exceptional soprano voice, she began a course of self-instruction, and in 1909 won a brilliant success in the rôle of Gilda, in *Rigoletto*, at a theater in Rome. Her career since then has been one of uninterrupted success. In opera and on the concert stage, she has received ovations in the chief cities of three continents. From 1916 until 1924 she was a member of the Chicago Grand Opera Company (now the Chicago Civic Opera Company), and has made numerous guest appearances at the Metropolitan Opera House in New York. In 1910 the singer married Luigi Curci, a painter. She divorced him in 1920, and a year later married her accompanist, Homer Samuels.

**GALLINULE**, *gal' e nule*, a water bird of the rail family (see RAIL), species of which are found both in America and the Old World.



GALLI-CURCI



THE FLORIDA GALLINULE

Gallinules are closely related to the coots (see COOT). The purple and Florida gallinules are common marsh birds of the United States, the former breeding from the Southern states southward to the West Indies and South

America, and the latter ranging as far north as Southern Ontario. These birds are a little over a foot long. Though not web-footed, they are excellent swimmers, for their long, slender toes are furnished with a narrow membrane. They are poor flyers and are timid, and during the daytime remain concealed in tangles of reeds and grasses of lakes and meadow-brooks, but at twilight they may be seen running gracefully over lily-pads, or diving for snails or water plants. Their flesh is only fair eating, but they are often shot for sport. The common gallinule of Europe is called water hen or moor hen in Great Britain.

D.L.

**Scientific Names.** Gallinules belong to the family *Rallidae*. The purple gallinule is *Ionornis martinicus*; the Florida, *Gallinula galeata*. The European gallinule is *G. chloropus*.

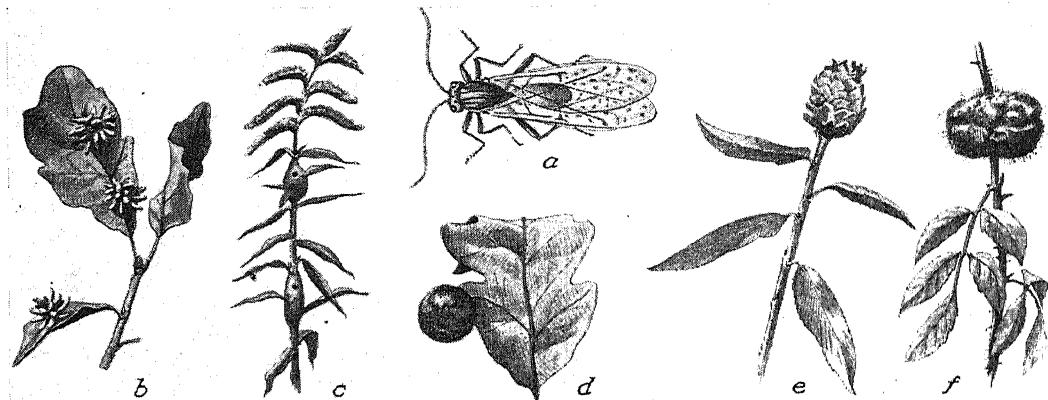
**GALLIPOLI**, *gah lip' o le*, a long, narrow and mountainous peninsula, also a town of the same name, in the Turkish province of Adrianople. The peninsula separates the Dardanelles from the Gulf of Saros, and in 1915, during the World War, it was the scene of terrific struggles between the Turks and Franco-British troops, in which the latter sought the capture of Constantinople. The town is at the northeastern extremity of the Dardanelles, 128 miles from Constantinople and ninety miles from Adrianople. It is not of any great commercial importance.

The peninsula is extremely fertile, and corn, oil, and wine are produced. During the Crimean War in 1854, allied armies of France and England landed on the peninsula of Gallipoli as protectors of the same Turkish power which in 1915 they sought to drive out of Europe. For map, see DARDANELLES. See, also, WORLD WAR.

**GALLIUM**, *gal' i um*, a chemical element, discovered by spectrum analysis in 1875 by a French chemist. It was found in the zinc ore at Pierrefitte, in the Pyrenees Mountains. The element is named after *Gallia*, the ancient name of France. Gallium is a rare metal, of grayish-white color, fairly hard, and capable of being hammered into thin plates which can be bent several times without breaking. It melts by the mere warmth of the hand into a silvery-white liquid, its melting point being 86° F. Its general properties are similar to those of aluminum (which see). Gallium combines with oxygen to form oxides, and with chlorine to form several kinds of chlorides. It has no commercial use. Its chemical symbol is *Ga*. See CHEMISTRY.

T.B.J.

**GALLON**, *gal' un*, a liquid measure with a capacity of 231 cubic inches. It is divided into four liquid quarts, each quart being equal to two pints, and each pint equivalent to four gills. The gallon is standardized in the United

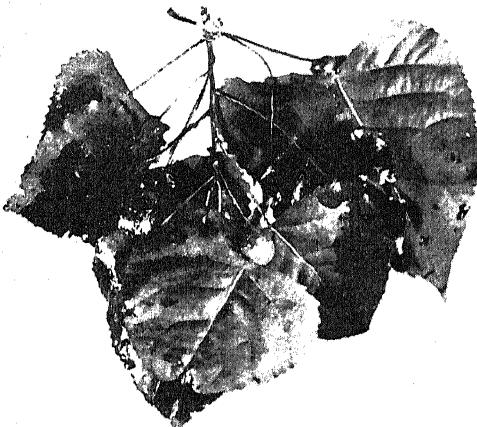


States, Canada, and England. Any cylindrical body six inches in height and seven inches in diameter will contain exactly one gallon. In England, an *imperial gallon* is also used; this measure has a capacity of 277.420 cubic inches. See DENOMINATE NUMBERS.

**GALLOWAY CATTLE.** See illustration, page 1254.

**GALLS**, *gawls*, unnatural growths on roots, stems, buds, leaves, flowers, or trees, produced by the presence of larvae (young) of insects, or in rarer instances by worms, fungi, slime molds, algae, or bacteria. The insect galls vary in size from the merest swellings to fruit-like growths several inches in diameter. Some contain but one larva, others have several—in some cases a dozen—larvae. In appearance there is great variety, from those which are smooth and shining to rough and hairy varieties; from trumpet-shaped, rosette, or starlike forms to ball or kidney shapes. Birds, squirrels, and insects tear open these strange little homes to feed upon the larvae within; but natural protection from such ruthless enemies is generally afforded by various interesting devices. Some galls secrete juices, thus trapping intruding insects; others are protected by color; and still others are bitter with tannin.

Many gall-producing insects are extremely injurious to vegetation, as the Hessian fly, which costs the United States and Canada millions of dollars' worth of wheat crops each year; or the destructive grapevine phylloxera, or the clover-seed midge. The small, dark, four-winged gallfly, however, is of some value, as it deposits its eggs in the leaves and twigs of various plants and trees, and when these are deposited in oaks, the familiar and valuable spongy white, green, or blue oak apples appear. From them are obtained tannin for leather tanning; they are also made into ink and dyes, and are frequently used in medicine. The galls of commerce are gathered chiefly by peasants in parts of Italy, formerly the center of that trade, and in Persia, Cyprus,



VARIOUS FORMS OF GALLS AND A GALL FLY

(a) Gall fly; (b) galls on leaf of California white oak; (c) stem of goldenrod, showing spherical gall above, made by the larva of a fly, and below, a spindle-shaped gall made by the caterpillar of a moth; (d) oak apple; (e) willow cone gall; (f) mossy rose gall. Below, galls made by insects as repositories for their eggs, on stem of poplar tree.

Asia Minor, and Syria. Although oak apples are abundant throughout America, the gathering would be too costly. The pioneers used them for ink and dyeing, and some of the oldest American documents show the bright, practically permanent ink of oak galls. B.M.D.

**Related Subjects.** The reader is referred in these volumes to the following articles:

|              |             |
|--------------|-------------|
| Algae        | Hessian Fly |
| Bacteria and | Insect      |
| Bacteriology | Phylloxera  |
| Fungi        | Slime Molds |

**GALL STONES.** See GALL BLADDER.

**GALSWORTHY**, JOHN (1867- ), one of the foremost of twentieth-century English novelists and dramatists, noted for his keen studies of social problems. Galsworthy is usually regarded as a writer with a purpose; many of his works deal with some evil or injustice

against which he protests. His efforts to secure reforms, however, do not mean that he has sacrificed artistic workmanship to propaganda; his novels and plays, on the contrary, are artistically successful, and literature of permanent value. He was born at Coombe, Surrey, and educated at Harrow and New College, Oxford. Though he prepared himself for the practice of law, he adopted literature as a profession.

**His Writings.** It is as a dramatist that Galsworthy first became widely known, although his first piece of writing was a novel, *Jocelyn*, published in 1898. *Villa Rubine* and *A Man of Devon*, his next novels, like *Jocelyn*, received little notice from the public, but after 1904 his talent was recognized. In that year appeared *The Island Pharisees*, a study of English life. In rapid succession thereafter he wrote *A Man of Property*, satirizing the ways of the great capitalists, *The Country House*, which deals with the life of the landed gentry, and *Fraternity*, which is largely a study of class feeling. His later books include *The Patricians*, *The Inn of Tranquillity*, *The Dark Flower*, *The Tatterdemalion*, *Saint's Progress*, *In Chancery*, *To Let*, *The White Monkey*, *The Silver Spoon*, and *Swan Song*. *The Man of Property*, *In Chancery*, and *To Let* have been published in one volume under the name *The Forsyte Saga*. *The White Monkey*, *The Silver Spoon*, and *Swan Song* are continuations of the chronicle.

His plays, many of which have been produced, include *Joy*, *Strife*, *Justice* (directed against the horrors of solitary confinement in prisons and the injustice of English divorce laws), *The Silver Box*, *The Pigeon*, *The Eldest Son*, *The Fugitive*, *The Mob*, *The Skin Game*, *A Family Man*, *Loyalties*, *Windows*, *The Forest*, and *Old English*.

**GALTON, gawl' ton, SIR FRANCIS** (1822-1911), an English scientist and author who is chiefly noted for his important researches in heredity, biology, and anthropology. He was educated at Birmingham and Trinity College, Cambridge. After spending two years in the Sudan, studying native types, he started on a journey of exploration through Damaraland and the Ovampo country in Southwest Africa. His published account of his travels brought him the gold medal of the Royal Geographical Society. Becoming interested in meteorology, Galton suggested many important theories and published extensive weather charts and articles on anti-cyclones.

On the subject of heredity, he held advanced views, and boldly advocated the decreasing of the birth rate of the unfit by suitable selection of parents. He was the first to use the

term *eugenics*, which has since universally adopted. Galton was singularly versatile, quick, yet thorough, and an enthusiastic worker. Honorary degrees were bestowed on him by Oxford and Cambridge universities, and in 1909 he received knighthood.

His notable publications are *Hereditary Genius—Its Laws and Consequences*; *Inquiries into Human Faculty and its Development*; and *Natural Inheritance*.

**Related Subjects.** The reader is referred in these volumes to the following articles:

Anthropology

Mental Measurement

Eugenics

(The Measurement

Evolution

of Intelligence)

Heredity



Photo: Brown Bros.  
JOHN GALSWORTHY

**GALVANI, gahl vah' ne, LUIGI** (1737-1798), an Italian physiologist and anatomist, is remembered especially for his discoveries in electricity. He was born at Bologna, studied medicine there, and in 1762 began to practice. In 1765 he became lecturer on anatomy at the University of Bologna. This position he held until the year before his death, when he was deprived of his professorship because of his refusal to take the oath of allegiance to the Cisalpine Republic. Just before his death he was reinstated.

His celebrated discoveries relative to the effect of electricity upon animal muscles are described in the article **GALVANISM**. See, also, **ELECTRIC BATTERY**; **CURRENT**, **ELECTRIC**.

**GALVANIC BATTERY.** See **GALVANISM**.

**GALVANISM**, a term formerly applied to current electricity produced by the action of an electric cell or battery. The name refers to the eminent Italian scientist, Luigi Galvani (1737-1798), who carried on for many years an important investigation of what he called animal electricity. In 1786, in the course of his experiments, he attached the legs of a freshly killed frog to a copper hook and hung it over an iron railing. A convulsive twitching of the muscles of the dead limbs occurred when the two metals touched. This phenomenon was thought by Galvani to be due to electricity in the nerves and muscles of the animal. Volta, the distinguished contemporary of Galvani, regarded the animal as the conductor of the electric current, which he rightly declared was generated by the contact of two unlike metals. Continuing his investigations, Volta showed that a copper and a zinc plate in contact are differently electrified, one having a positive and one a negative charge. Out of his experiments came the electric, or voltaic, cell, a unit of the familiar primary battery. In course of time, the use of the name galvanism and galvanic battery for current electricity and the voltaic, or electric, battery was largely abandoned. See **ELECTRICITY**; **ELECTRIC BATTERY**.

H.S.E.

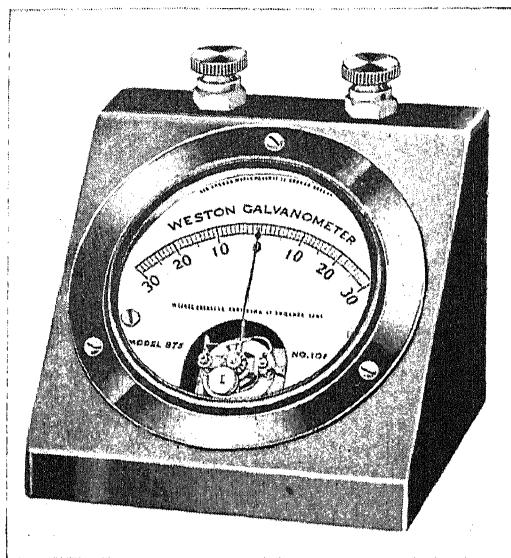
**GALVANIZED IRON**, a name commonly applied to thin sheets of iron that have been

coated with zinc as a protection against rust. The process is not in any way galvanic, but consists of first cleaning the iron in a warm solution of sulphuric or hydrochloric acid, and then immersing it in a bath of molten zinc and sal ammoniac. As the zinc cools, it deposits crystals on the surface of the iron, giving it a mottled appearance. Galvanized iron is extensively used in corrugated and plain sheets for cisterns, roofs, and buildings. In parts of South Africa, early in its colonization, this metal was in such general use for dwellings that whole villages and towns had galvanized-iron houses lined with match boarding. In Western Canada, it is used to some extent for roofing, but it is unsuitable there for any other part of houses, as it affords little protection against cold. During the South African War, large cylinders of galvanized iron filled with earth and stone were extensively used for blockhouses and minor fortifications.

A method of protecting iron against corrosion by coating with zinc was known to the French as early as 1742; records published in 1786 gave directions for a process of zincing iron vessels, which was then in use at Rouen, France. In 1837 H. W. Craufurd, an Englishman, took out the first patent for galvanizing iron, and his process is essentially the one now used. The type known as galvanized tinware is made by taking the scoured iron and placing it in a bath of chloride of tin solution, in which powdered zinc and the iron are arranged in alternate layers. In this way, the iron is electroplated with a thin layer of tin, and afterward coated with zinc by the same process as described above. This product has the advantage of a smooth surface, and it is preferred to the ordinary galvanized iron for some uses. Sulphurous compounds attack galvanized iron, and it should not be used in places where the iron would be subjected to smoke containing a large percentage of sulphur, or put in direct contact with destructive chemicals.

**GALVANOMETER**, *gal van om' e tur*, a delicately adjusted instrument used to detect the existence, and to measure the strength, of electric currents. There are several patterns, but all are based on the fact that an electric current in passing through a wire produces a magnetic field about the conductor. Such a field can be made to deflect a movable magnet, and the resulting movement will indicate the presence and strength of the current. Conversely, the magnetic field produced by a fixed magnet may be made to turn a coil of wire through which current is being conducted. In the original type of instrument, a magnet is deflected by the field created by a stationary conductor. Lord Kelvin's astatic galvanometer is a standard instrument of this class. This has two coils consisting of many turns of fine wire wound in opposite directions. Two sets

of magnetic needles within the coils are arranged in the astatic position; that is, the needles are so connected that their poles are reversed and neutralize each other. By means



A PORTABLE GALVANOMETER

of a mirror attached to one of the needles, a light ray is reflected onto a scale giving indication of the slightest movement of the needle. This instrument can register a current as minute as one fifty-billionth of an ampere—too minute to be comprehended.

The galvanometer in most common use at the present time is the *D'Arsonval*, in which a stationary magnet affects a moving coil of fine wire. The latter is suspended in an upright position between the poles of a compound horseshoe magnet, and at the bottom is attached to a binding post by a spiral spring. The current enters the coil through the suspending wire, and leaves it through the spiral, or conversely. When current is flowing, the coil tries to turn so that its north pole points toward the south pole of the permanent magnet, and its south pole in the reverse direction. When it comes to rest, the amount of its turning is noted, and gives the measure of the current. A small mirror attached to the coil reflects the reading of a stationary scale.

Larger currents than can be measured by the ordinary galvanometer are recorded by the ammeter (ampere-meter), a portable form of galvanometer widely used in engineering, science, and industry. The device on the instrument board of an automobile that registers the current from the battery is an ammeter. A voltmeter is a similar instrument which measures voltage. See AMPERE; VOLTMETER.

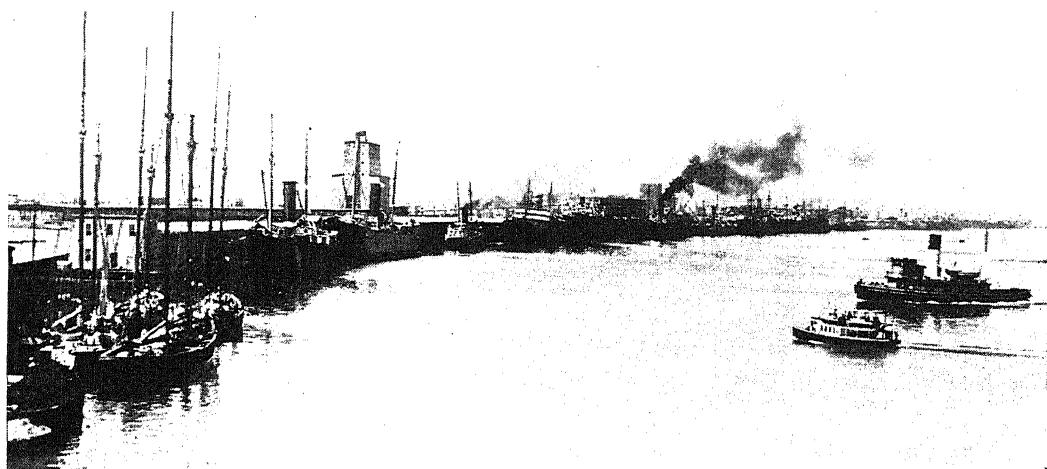


Photo: U &amp; U

## ALONG THE WHARVES AT GALVESTON

At left, deep-sea fishing schooners; in the left center, one of the city's large elevators; ocean steamers are seen near the center of the illustration. Including space in wharf-slips, Galveston can accommodate at one time about one hundred ocean-going vessels.

**GALVESTON, TEX.**, an important commercial port, and the county seat of Galveston County, is situated on the east end of Galveston Island at the mouth of Galveston Bay, an inlet of the Gulf of Mexico. It is fifty-three miles southeast of Houston, and 300 miles (direct) southwest of New Orleans. The island on which the city stands is thirty miles long and has an average width of two miles.

Galveston is a typical Southern city, with its stately mansions, luxuriant gardens, and streets lined with palms, oaks, oleanders, magnolias, and jasmine. A sea wall and beach extend the entire southern length of the city. The place is a popular winter resort, attracting great numbers of visitors annually. Population, 1928, 50,600 (Federal estimate).

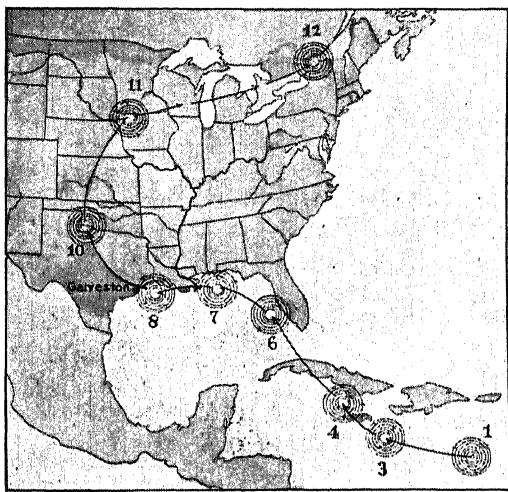
**Transportation.** Railway facilities are provided by the Gulf, Colorado & Santa Fe, the Missouri, Kansas & Texas, the Galveston, Houston & Henderson, the Southern Pacific, and the Missouri Pacific lines. The city also has the Galveston-Houston electric railway and motorbus service. Steamer lines have regular sailings to New York and to European, Asiatic, and North and South American ports.

**Industries.** With its splendid harbor, wharves, and granite jetties, Galveston is one of the busiest ports of the country. Cotton and sulphur are the most notable articles of export. Sixty-four steamship lines lead to 125 of the world's ports. The most important industrial enterprises are the Galveston Wharf Company, the cotton compress and concentrating plants, flour mills, and a beverage plant. There are four export-grain elevators, and numerous large wholesale houses.

**Institutions.** The city has the state medical college, which is a department of the University of Texas; John Sealy Hospital, which operates in con-

nexion with it; a number of Catholic schools; and the Rosenberg Library.

**History.** In 1836 Colonel Michael B. Menard organized the Galveston City Company and purchased the site of modern Galveston from the Republic of Texas. The city was incor-



PATH OF THE HURRICANE

The figures indicate days of the month and show the rate of speed of the wind, which reached its greatest velocity at Galveston.

porated in 1839 and named in honor of Count Bernardo de Galvez, Spanish viceroy of Mexico. During the War of Secession, it was captured by the Federal troops and retaken in 1863 by the Confederates, who held it until the close of the war. On September 8, 1900, the city was visited by a West Indian hurri-

cane, which caused a tidal wave that wrought destruction of life and property.

To prevent another such catastrophe, three engineering feats have been accomplished—the erection of a sea wall, the raising of the city grade, and the building of a causeway spanning Galveston Bay, to connect the city with the mainland two miles away. The sea wall is a concrete steel-reinforced battlement seven and a half miles long, sixteen feet wide at the base, and seventeen feet high. In raising the grade, the city was lifted to a height of nineteen feet above its former level, two feet higher than the sea wall.

During the chaos following the disaster, a group of three men assumed responsibility for the government of the city, out of which grew what is now known as the commission form of government. This has been adopted widely throughout the United States, Canada, and Europe.

E.S.H.

**G A M A**, *gah'-mah*, VASCO DA (1460?-1524), a Portuguese navigator, the first to sail around the Cape of Good Hope, and the discoverer of the sea route to India. He was descended from a noble family, and at an early age became known as a fearless mariner.

The king of Portugal selected him to command an expedition to find the way to India, and he set sail on July 8, 1497. After visiting Calicut, he returned to the Portuguese court with reports of the boundless wealth of India, and was richly rewarded with rank of nobility, a pension, and great commercial privileges. Named Admiral of the Indies, he made a second successful voyage, and in 1524 went to India as viceroy, to remedy the ill effects of the misrule of the king's repre-

sentatives. The same year he died at Cochin. His body was later removed to Portugal and buried with honors in Lisbon.

**G A M A**, *gah'-ma*, GRASS, or SESAME, *ses' a me*, GRASS, a perennial fodder grass found naturally in moist soil from Connecticut to Kansas and south to Florida and Texas. It endures drought, but is quickly killed by frost. From stout rootstocks its coarse, pithy, branching stems grow to a height of nine or ten feet. Its leaves, about six feet long, resemble those of Indian corn. In midsummer it bears spikes of feathery, dark-purple flowers, topped with long, orange-colored anthers.

Gama grass makes palatable hay if cut when young, but the older stems are woody. B.M.D.

**C l a s s i f i c a t i o n.** The plant is known scientifically as *Tripsacum dactyloides*. Of the wild grasses, it is considered the nearest relative of Indian corn.

**G A M A L I E L**, a Jewish doctor of the law and member of the Sanhedrin, who showed his good judgment and common sense when he urged his colleagues not to persecute Peter and the other Apostles for preaching Christ to the people (*Acts v, 34*). He was the rabbi, or teacher, who taught Saint Paul in his youth, and was held in the highest respect among his country-

men. On that account they were guided by his reasoning when he said that if the Apostles' work were simply man's, it would finally come to nothing, even if they took no measures against it, while if it were of God, they could not overthrow it, for they would be fighting God. He is said to have been president of the Sanhedrin for several years, but the report that he became a Christian is without proof.



Photos: M. K. & T.

GALVESTON'S SEA WALL

At top, pleasure-seekers in the shadow of the wall. Center, airplane view of wall and beach. Below, the driveway and promenade on the wall, more than seven miles in length.

He was one of the Pharisees. See SANHEDRIN; PHARISEES.

**Derivation.** The word *Gamaliel*, of Hebrew origin, means "God is a reward."

**GAMBETTA**, *gam bet' ah*, LEON (1838-1882), a French statesman noted for his bitter opposition to monarchical government. As a lawyer, he met with great success in Paris, chiefly in defending political prisoners. In 1869 he was elected to the Chamber of Deputies, and his republican views immediately attracted attention. He strongly opposed the policy which resulted in the Franco-German War in 1870 and led bitter attacks against the Empire. He escaped from Paris in a balloon during the siege, and established what amounted to a dictatorship at Tours. Calling on the nation to rise in a mass to overwhelm the Germans, he conducted a fierce resistance. He accused Marshal Bazaine of an act of treason in surrendering Metz, and was active in securing his trial after the war. After peace was made, Gambetta held office in several ministries and became Premier in November, 1881, resigning in 1882. See FRANCO-GERMAN WAR.

**GAMBIA**, the most northerly of the British colonies on the west coast of Africa, covering an area of about 4,130 square miles. It extends, as a long triangle, on both sides of the River Gambia, which is navigable for 200 miles from the ocean. The climate is more healthful than elsewhere on the west coast, for there the malaria-carrying mosquito has been practically exterminated. Rice, maize, cotton, ground nuts (the basis of margarine), rubber, and palm oil are produced. The rivers and creeks are inhabited by hippopotami and crocodiles, and lions, leopards, monkeys, wild boars, and many kinds of deer are found in the forests and plains. The capital is Bathurst, on the island of Saint Mary, at the mouth of the Gambia. Population, 270,000; of Bathurst, 10,500.

**GAMBIER.** See CATECHU.

**GAMBOGE**, *gam bojé'*, OR **CAMBOGE**, a resinous gum derived from the gamboge tree (*Garcinia hanburyi*), a native of Cambodia, Ceylon, Siam, and other Far Eastern countries. The tree grows to a height of forty or fifty feet, has oval leaves like those of the laurel, and square-shaped, four-seeded edible fruit. The gamboge is obtained by making incisions in



LEON GAMBETTA

the bark of a tree, in the same way that maple trees are tapped. A bamboo tube is so placed that the juice is carried off and received in coconut shells or other receptacles. The juice hardens on exposure to the air, becoming a dirty orange on the outside and brilliant yellow inside. It is chiefly exported by way of Singapore, and is sold commercially in hollow rolls, sticks, and shapeless lumps.

Gamboge is extensively used by artists in mixing water colors, for staining wood, and as a lacquer for brass. In medicine, it is occasionally employed as a cathartic, but its action is harsh, causing severe griping. It is said to be effective in minute doses in cases of dropsy and apoplexy when taken in conjunction with a sedative. American gamboge, which is used for the same purposes, is obtained from a similar tree (*Vismia guianensis*), native to Mexico. It is somewhat inferior to the imported variety. G.M.S.

**GAMBUSIA.** See ZOOLOGY (How Zoölogy Affects Human Welfare).

**GAME**, the general name for animals which are hunted, ranging from truly wild beasts, such as tigers and bears, to small, helpless creatures like the rabbits and fowls.

**Game Laws.** There are two distinct types of game regulations, those intended to make hunting the privilege of aristocracy, and those to prevent the wanton destruction of game and the possible extermination of a species of animal life. The first are characteristic of European countries; the second, of America. Each of the American states and Canadian provinces has its own game laws. Most of them forbid shooting except during a short period of each year, known as the *open season*, and restrict the number of animals which each hunter may kill, have in his possession, or ship out of the state. Any person may secure a copy of his state or provincial game laws by addressing the game warden, at the capital. In Canada, a law of the Dominion places a rigid limit upon the export of game.

**Private Game Preserves.** Because of the existence of many private estates which have survived from the Middle Ages, there are in Europe large numbers of areas where game is preserved that the aristocracy may indulge in the traditional sport of hunting. In America, private preserves are less common. That of the Roberval Club, in the Laurentian Mountains north of the city of Quebec, contains more than 500 square miles of forest, and there are a number of others belonging to sportsmen in the United States and Canada which contain several thousand acres. Other private game preserves are maintained by lovers of wild life who wish to prevent the extinction of buffalo, waterfowl, and other beasts and birds that are prey for the hunter, unless protected.

**Game Reservations.** National, state, and provincial governments in America have taken steps to preserve the native fauna of the continent by setting aside large tracts where the animals may live unmolested. Among these are the national parks, the largest of which are the Jasper Park in Alberta, containing 4,400 square miles; the Rocky Mountains Park, in the same province, with an area of 2,751 square miles; and Yellowstone Park, in the United States, 3,348 square miles in extent. The Laurentides Park in the province of Quebec is slightly larger than the Yellowstone. Thousands of wild animals make their homes in these parks, among them elk and buffalo,

deer and antelope, mountain sheep, moose, bear, and beaver. The French government has set aside several islands in the Antarctic regions as game sanctuaries for the polar bear, walrus, seal, and other animals. The largest game reservations in the world are those of the British government in Central Africa, where the rhinoceros, the hippopotamus, and other strange beasts are native. A similar reservation has been created in the Belgian Congo. See, also, BIRD (Government Protection of Birds).

W.N.H.

GAME LAWS. See above.

GAME RESERVATIONS. See GAME subhead.



# G

## The Story of

## GAMES and PLAY

**AMES AND PLAY.** Time was, not more than a few generations ago, when play was looked upon as an almost unmixed evil—necessary at times, to be sure, but by no means to be encouraged. Children wanted to play, and most parents were not hard-hearted enough to keep them from it entirely, though looking upon it as a waste of good time which might have been far better employed in some useful occupation. Even to-day, elderly persons are found who look back to their childhood almost with bitterness, because of the dull work-a-day lives they were forced to lead, unrelieved by the joyous sports natural to youth. The son of a preacher of the old school declares that whenever in his boyhood he began the most innocent of plays, his father called him into the house to sing, "My God, my heart I bring to Thee." This father did not understand the value of play.

At present there is danger of the pendulum's swinging too far in the other direction and of the child's having too much play, but the wise teacher or parent can regulate that matter easily. Of course, with a child, the difference between play and work is one of mental attitude—the play is often far more strenuous than are his simple tasks, and calls for more concentration, but he does it joyously because he has the play attitude toward it.

**Value in Play.** Why is it that the educational world, blind for so long to that particular phase of children's activities, has now come to look upon play as so important that special provision is made for it in the course of studies? And why are large cities providing

public playgrounds and attendants who can teach the children interesting and healthful games? The explanation of these changes in policy is in the recognition of the truth of Froebel's statement that "Play is not trivial; it is serious and fraught with deep meaning." "If this be true," the teachers and the children's welfare committees have argued, "if play really is a serious matter, then it is worth the serious attention of grown people."

That this is true no one who has watched children at their play can doubt. In no way can a child express himself more fully than in his play. His ingenuity, his memory, his power of concentration, all of these are brought into service, while as a means of developing the social spirit and preventing undue insistence on self, competitive games are unrivaled.

Then, too, play actually helps work. Little children sit in school until their minds as well as their bodies have become tired and stiff; but a few moments of play will send them back to their tasks relaxed and refreshed, and the teacher has not nearly so much difficulty in holding their attention as before.

**Aim of Play.** When children play by themselves, undirected, they have no conscious aim but to "have fun." This article, however, is intended to give aid not only to children who are on the everlasting quest for "something to do," but to teachers and others who have charge of children during their play periods. The unconscious play of children is full of suggestion, and teachers must endeavor to keep themselves in the background. To know what plays or games are best and most attractive to

children, careful students of childhood have devoted their best efforts to the study of those games children most delight in. To fulfill the purposes of such play-directors, games must have certain characteristics and must help the children in certain ways. Taken altogether, games and plays should be:

(1) *Hygienic*, bettering in some way the circulation or respiration, and so improving the general health.

(2) *Corrective*, tending to straighten little backs that are in danger of becoming curved with too much bending over desks, to give a correct poise to a drooping head, or in some other way to correct defects in posture.

(3) *Educative*, training muscles, nerves, or brain to act quickly and accurately.

(4) *Recreative*, having the one purpose of relaxing and brightening the minds of the children, and so fitting them to go on with their work.

Naturally, every game cannot excel in all these points, and care should be taken to vary the games, so that no one purpose may be too long insisted upon. Very seldom is it necessary for the pupil to know what the teacher is attempting to accomplish by a certain game; indeed, such knowledge often defeats the purpose. For instance, if the teacher says, "Hold up your heads and throw back your shoulders; this game is to keep you from becoming stoop-shouldered," she is certain to have but a feeble response. But if at the outset she declares that they are now to play a soldier game, and calls out, "Soldiers, attention!" heads will be

held up and shoulders straightened half unconsciously.

**Games in the Schoolroom.** First and foremost, the teacher should enter as far as possible into the spirit of the game, not only because she herself needs the relaxation, but because the children enjoy far more a game which they feel is interesting enough to hold "teacher's" attention. So far as possible, the children should be allowed to choose the games, as they will then enter into them far more spontaneously.

As to methods of introducing games,

the teacher needs to remember but a few simple suggestions. A game cannot be explained and played successfully at the same time, and full explanations should therefore be made before the playing starts. The explanation should be as short and simple as possible, that the eagerness of the children may not be dulled. In the playing of competitive games, each side should be encouraged to do its best to win; nothing can teach children the difficult art of being good losers and the almost more difficult one of being good winners, except actual participation in games. "Honor" should be made a strong point, too, and the rules of the game insisted upon. It is a well-established fact that the boy who would rather lose a game than do anything in the least dishonest to win it will some day be the business man whom his associates can trust. It should be made clear that the same rules hold good for girls.

## Games For Young Children

### IN THE SCHOOLROOM

**Follow the Leader.** A child who is not afraid to "start things" is chosen as the leader, and the children fall in line behind him. In and out through the aisles and around the room he leads them, making certain motions which every child must imitate. He may run or skip, step high as if he were stepping over hurdles, clap his hands, wave his arms, or hold them above his head—anything which his fertile brain may devise. This is a brisk game and freshens the children up wonderfully. During this and all other games of action, the teacher should throw open the windows.

**Playing Train.** Each child is given the name of some part of a train. Thus one may be the wheels, one the bell, one the conductor, one the engine, and so on. They take their places in a row and run their "express train" through the aisles and around the room, each child acting out his part so far as possible. When the teacher calls out that the train is at a

station, the children take their seats and another group becomes the train. Very little children find much diversion in this, and it is a good recreative game.

**Do As I Do.** A "teacher" is chosen from among the pupils and takes his place in front of the others, who stand either at their desks, or in a semicircle. All except the leader then sing:

"Now, John, will you teach us  
A new game to play?  
We'll watch you and try to  
Do just as you say."

The "teacher" performs some simple exercise in which he wishes the others to follow him, as raising his arms above his head and bending to touch the floor with the fingertips, running in place, or rowing, and the others do as he does.

**I Saw.** A child in each row is called on to tell of some action he has seen: "I saw a dog running," he



FOLLOW THE LEADER

says, or, "I saw a frog jumping," or, "I saw a swallow flying"; and all the children in the row imitate the action, while following the leader about the room. In any such play as this, care must be taken to select occasionally the bashful children, who will not speak out unless they are expressly called upon.

**Catch the Squirrel.** This game is certain to interest the children, but it gives only one or two of them exercise at a time, and should, therefore, not be used as often as those games which permit all the pupils to be in action at the same time. Each child blinds his eyes and lays his head upon his desk, but keeps one hand open that the child who has been chosen as "squirrel" may drop a nut into it. The child who receives the nut springs up instantly and runs on tiptoe after the squirrel, trying to catch him before he can reach his seat. If he fails to catch him, he becomes squirrel in turn.

#### IN THE HOME

Games that are to be played in the home are of necessity quieter, and call for fewer players than do the schoolroom games, but some of them, at least, should have some action. On a stormy day, when children must remain within doors, and they become restless in consequence, a game or two of action, played in a room with open windows, will "tame them down" wonderfully.

**Ring-Toss.** This is a game which has real educational value, in that it develops precision of movement and a ready response of muscles to mind. A circular stick about a foot in length—a portion of a broom handle will answer excellently—is made to stand upright by driving it tightly into a hole which has been bored in a board about a foot square; five or six rings are provided, of such size that they will slip easily over the stick. The players then take their station a few feet away and attempt to toss the rings over the stick, each player throwing all the rings and keeping count of his successful tosses. Gradually the distance between the player and the stick is increased.

**The Garden Gate.** All the players except one join hands and dance in circle about the one who has been chosen as "it," who meanwhile sings to them to the tune of "Here we go round the mulberry bush":

Open wide the garden gate, the garden gate,  
the garden gate,  
Open wide the garden gate and let me through.

They then dance in the opposite direction, singing all together:

Get the key of the garden gate, the garden gate, the  
garden gate,  
Get the key of the garden gate and open and let  
yourself through.

The one inside the circle then pretends to weep and sings in reply:

I've lost the key of the garden gate, the garden gate,  
the garden gate,  
I've lost the key of the garden gate and cannot let  
myself through.

Still dancing round and round her, the others sing:  
You may stop all night within the gate, within the  
gate, within the gate,  
You may stop all night within the gate, unless you  
have strength to break through.

The prisoner then rushes suddenly to the ring and throws her whole weight upon the clasped hands of two of the children, trying to break through; and if she succeeds, another player takes her place in the ring.

**My Lord's Toilet.** Each child in the party is given the name of some article of a gentleman's dress, and then all take their seats but one, for whom no chair is provided. This one, called the Valet, takes his stand in front of the rest and calls rapidly for the different articles. "My lord's up and wants his collar," he cries, when the person who represents the collar must jump up quickly, call out "Collar," and sit down again. If any player does not respond instantly, he must pay a forfeit. Occasionally, the Valet explains, "My lord's up and wants his whole toilet," when all the players must jump up and change chairs, the Valet scrambling for one also. The one who is left standing becomes Valet in turn.

#### OUT-OF-DOORS

Of course, the ideal playing ground is out-of-doors; not only is the air purer, but the children are rid of the cramped feeling which is inseparable from indoor playing, and can really stretch their muscles. Certain of the games described above can easily be played out-of-doors, and some of those listed below may be used indoors in stormy weather, if there is a considerable open space. Especially is this true of the bean-bag games.

**Games with Bean Bags.** A set of bean bags should be in every schoolroom, and the children will usually be glad to make them. These bags should be of some strong material, bright-colored if possible, should measure about five by five inches, and should be about half full of beans.

For the simplest of the bean-bag games, the children form a circle about one of their number, who is the "teacher." He tosses the bag to the others either in rotation all around the ring or out of turn, with the object of catching some player napping. The one thus caught becomes "teacher" in turn. Then, to vary the game, the teacher may throw the bag into the air and call the name of some child, who must spring forward and catch it before it touches the ground.

In another bean-bag game, the children stand in two rows, facing each other. The first child in one row tosses the bag to the second in the other row, who tosses it to the third in the first row, the bag keeping its zigzag course until it reaches the end of one row, when it is tossed directly across and then back again in the same zigzag manner. Thus the children who did not have a chance to catch the bag as it passed down the line have their turn on its return journey.

**Cat and Mouse.** In this game, the players join hands to form a circle, and stand about an arm's length apart. One player, the cat, stands outside the circle, while the mouse, the one to be caught, stands inside. Those who form the circle may raise their arms to allow cat or mouse to pass in and out of the circle, or they may hinder them by lowering their arms. When the mouse is caught, other players are chosen.

**Posture.** The players stand in a circle, three or four yards apart, and a ball or bean bag is tossed

rapidly from one to another. Each one who misses must remain as though turned to stone, in the attitude in which he was when he failed, and the last to miss wins the game. He tosses the ball into the air and catches it ten times, while the others retain their positions.

**Drop the Handkerchief.** This is always a favorite with the children, and it is a good game for a large party. All the players save one form in a circle, the one taking his place outside with a knotted handkerchief in his hand. As he runs about the circle, he sings:

Itasket, Itasket, a green and yellow basket,  
I sent a letter to my love and on the way I dropped  
it, I dropped it,

A little boy picked it up and put it in his pocket.

Quietly he drops the handkerchief and runs on, trying to get around the circle and tag the player behind whom he dropped it, before it has been picked up. If the player discovers it, however, he picks it up and runs with it, trying to tag the one who dropped it before he reaches the vacant place.

**London Bridge.** Two children join their raised hands to form a "bridge" under which the others must pass in line, the two singing:



LONDON BRIDGE

London bridge is falling down, falling down, falling down.

London bridge is falling down, my fair lady.

With the last word, the "bridge" is dropped over one player, who is led aside to the tune of—

Off to prison you must go, you must go, you must go.  
Off to prison you must go, my fair lady.

The prisoner is then asked to choose between two objects, one of which has been selected by each of the two "bridge-tenders," and takes her stand behind the one whose object she has chosen. The game goes on until all have been imprisoned, the side which has secured the most players winning the game.

**Moon and Morning Stars.** This is a game to be played in the sunshine. The player who takes the

part of the moon stands in the shadow of the schoolhouse, tree, or other object, and is not permitted to go into the sunshine. The other players, the morning



DROP THE HANDKERCHIEF

stars, dance into the shadow near the moon, and call:

O the Moon and the Morning Stars!  
O the Moon and the Morning Stars!  
Who will step—Oh,  
Within the shadow?

The moon then attempts to tag the stars. Anyone caught may be kept with her or change places with her.

**Frog in the Middle.** This game may be played by any number. One is chosen to be the frog, and must sit with crossed feet in the center. The other players, who stand in a circle about him, keep repeating, "Frog in the middle can't catch me!" They dance back and forth in front of the frog, seeing how near they can go without being tagged. The frog tries to tag them, but must not change his position. Anyone tagged must be frog.

**Other Games.** Any crowd of children is certain to have its favorite games, in addition to those listed above. One or more can always be found who will be only too eager to lead the rest in Pussy Wants a Corner; Farmer in the Dell; King William Was King James's Son; Here We Go Round the Mulberry Bush; Oats, Peas, Beans, and Barley, O; I Spy; and any of the various kinds of tag. It is difficult for an older person to understand the charm which such a game as The Farmer in the Dell, for instance, holds for children. True, there is little action, but the children find very attractive the circling about in time to the meaningless chant, while the chance of being "taken" next keeps each little player keyed up and interested. The one directing the play should see that all are given turns.

### Games for Older Children

As children get older, a change is noticeable in the play element which most appeals to them. They no longer are satisfied merely to keep on the move, while the little verses which accompany so many of the young children's

games seem to them foolish. Instead, they have the competitive instinct strongly developed—they are intensely anxious for their own side to win. Races, therefore, of one sort or another, are likely to appeal to them.

## IN THE SCHOOLROOM

**Overhead Race.** Any objects which are not too heavy, as bean bags, or books, are held aloft by the pupils in the front seats. All the other children sit erect, also with arms raised high above their heads, and at the given signal, the bags are passed back from hand to hand until they reach the last pupil, when the process is reversed and the bags are passed forward. When a first-seat pupil receives his bag again, he rises to show that his row has won. This game never fails to rouse great enthusiasm, and the breathless haste which it calls for stirs up sluggish blood.

**Another Bean-Bag Game.** This is an excellent game, but unless a number of boards are provided, only a part of the children can take part in it each day. In a piece of thin board, or heavy pasteboard, are cut five holes, each six inches square, and these are numbered 10, 20, 30, 40, 50. This is placed in a slanting position, with one end raised about nine inches from the floor, and the players take their stand about ten feet from it and try to toss bean bags through a hole. Each successful throw credits the player with points according to the number of the hole through which the bag has passed, while every bag which falls on the floor takes ten from his count. Thus, if a player throws six bags, sending one through the 10 hole, two through the 20, one through the 40, and two on the floor, his score will be  $10+40+40-20$ , or 70.

**First In, First Out.** Groups of three erasers, or bean bags, are placed in squares, marked on the floor with chalk in front of alternate rows. Beginning with the pupils in the front seats of these alternate rows, the players take one object at a time from each of the squares, placing them in similar squares at the back. They must run down one aisle and return by the other. As soon as all the objects are gathered, they are brought back in the same way, and the pupils in the second seats continue the game without any interruption. Then the pupils in the third seats repeat the process, and so on down the row. The row which finishes first makes known the fact by clapping. Such a game is exciting and very enjoyable, and is excellent for giving an outlet for the repressed energies of children between the ages of ten and fourteen.

A similar game may be played in which the players run to touch front and back wall in succession, and then take their seats.

## Quiet Games

"What shall we do?" What mother has not heard that repeated, especially on stormy days, until she has dreaded the sound of the words. Here are a number of games which may be played indoors without any great amount of noise, and all are so simple that children can play them.

**Hot or Cold.** One child leaves the room and some object is hidden by the others. When he returns and starts his search, the others aid him by humming or singing softly to show that he is "cold," or far from the hiding-place, and more loudly to show that he is getting "hot," or closer to the object.

**Rhyme Words.** One player thinks of a word and tells the others, not the word itself but one that rhymes with it, while they try to find out the word

## OUT-OF-DOORS

**Tug of War.** A chalk line is drawn, and the players divide into two parties, one on each side of the line. Each group then grasps one end of a long strong rope, and at the word of command, the two sides begin to pull against each other. The side which pulls its adversaries over the dividing line wins the game.

**Catch the Salmon.** Two boys are chosen as "fishermen," and each grasps an end of a piece of strong rope. All the other players, the "salmon," take their place in the "sea"—which is the space marked off by a chalk line. The salmon-catchers may not cross this line, but may advance to it and try to throw their rope over a "fish," for the fish are daring and come very close to the line. Once caught, a salmon may twist or jump or stoop, but he may not free himself with his hands, and when he is dragged across the line, he must cease to struggle—he has been "landed."

**Run, Sheep, Run.** The players divide into two sides, each with a leader, and a goal is decided upon. One party remains at the goal, while the other goes off and hides, agreeing with its leader as to certain signal words. The leader then returns and stays near the other flock as it hunts for the hiders, calling out his signals from time to time to warn his flock. When he feels that the seekers are getting so close that discovery is certain, or when they have gone so far from the goal that his flock may reach it first, he calls "Run, sheep, run," and the hiders dash toward the goal. If they arrive ahead, they have another chance to hide.

**Other Games.** Almost innumerable are the games which are adapted to these older children; many of them are so well known that it is necessary merely to mention their names. Last Couple Out and Three Deep are general favorites, and many a picnic crowd beyond children's age finds in them much enjoyment. Fire on the Mountain, Prisoner's Base, Fox and Geese, Leap Frog, and Crack the Whip are others which almost every child will recognize by name. In some of these, especially in the last-named, care should be taken lest they become too rough. Every group of children will doubtless be able to suggest other favorite games.

by asking questions. For instance, "I'm thinking of a word," says the leader, "which rhymes with *can*." "Is it a color?" says one. "No, not *tan*." "Does it help to keep us cool?" "No, not *fan*." "Does it walk on two legs?" "No, not *man*." "Do we see it in the kitchen?" "Yes, it is *pan*." The one who has guessed correctly then chooses a word, and so the game goes on. This game may be varied by having the leaders and guessers spell the words. Thus "I am thinking of a word that rhymes with *p-a-n, pan*." "Is it *c-a-n, can*?" "No, it is not *c-a-n, can*." "Is it *p-a-n, pan*?" "Yes, it is *p-a-n, pan*." For the older children, the game becomes interesting as a test of vocabulary and good spelling, and gives pleasure as a mental stimulus.

**Ten Questions.** An object is chosen in the absence of one player, and he must then guess what it is by

asking questions, limited in number to ten. Each of these must be in such form that the answer may be "yes" or "no," except the first, which is usually "Is it animal, vegetable, or mineral?"

**Buzz.** Very little children cannot play at this, but all those who have mastered the multiplication table up to "seven times" will find it very interesting. Sitting in a circle, the players count in turn, "One," "Two," "Three," and so on, but whenever seven, or any multiple of seven, or any number in which seven occurs is reached, *Buzz* must be substituted. Thus, 7, 14, 17, 21, 27, 28, and so on will not be named, the word *Buzz* taking their place. Any player who gives the number instead of *Buzz* must drop out.

**Beast, Bird, or Fish.** One child stands in front of the rest and says rapidly, "Beast, bird, or fish!—Fish, John," and John, or anyone else called upon, must then name a fish before the leader has counted ten. The three different classes of animals should not always be called for in regular succession, as this makes the game too simple, and very soon children will tire of it.

**Kitty Miaou.** The "cat" is stationed outside the door of the room within which the other players are assembled. In response to the cat's "miaou," one child after another repeats "miaou," while the cat tries to recognize each by his voice. The first one so recognized becomes the cat in turn.

## Public Games

Wonderful as seems the great popularity of all modern competitive games, whether interscholastic or professional, these do not yet play so large a part in the life of the people as did the great games of the ancient peoples. Most of these were looked upon as religious festivals, and in no way could greater honor be shown the dead than by the celebration of elaborate games. In the *Iliad*, Homer tells how the two armies made a truce, that Hector, the great Trojan hero, might be buried with fitting rites and games. These ancient games were chiefly exhibitions of strength or endurance, and included running, wrestling, boxing, discus-throwing, and chariot-racing. No valuable prizes were given, but the simple laurel wreath which crowned the victor was looked upon by the Greeks as the highest honor a man could win. Best known of these famous game-festivals, which played a large part in Greek life by promoting national unity, and by developing that type of "sound mind in sound body" which Greek art and literature depict, were the so-called Olympian Games (which see). In Rome the games were often of a lower and more brutal order, consisting of gladiatorial combats, or of conflicts of men with wild beasts in the arena, but so thoroughly did they satisfy, that "bread and the games" were the two things demanded from the emperors.

In modern times, baseball is the great professional game in America, while other athletic games are largely the province of schools and colleges. Very pretentious are some of the great football struggles between large schools, and many thousands of people watch them with breathless interest. Some years ago, the Olympian Games were revived as an international affair, and were of world-wide interest until interrupted by the World War; since then they have been resumed. See **OLYMPIAN GAMES**.

The great value of games is not that thousands shall sit cramped in uncomfortable bleachers in freezing weather to see a group of young men who have undergone training for months, struggle in a game of football;

but that all our youth shall receive, while still attending school, such training as will make for a completely rounded physical development. That this can be done, and joy and power be added, should be a cause of rejoicing, and the efforts of parent and teacher should be united to make our boys and girls stronger, more alert, better able to withstand all enemies of health—through consistent, normal, regular training in calisthenics, swimming, and out-of-door games that develop the muscles, train the eye, and keep the heart clean and pure.

**Related Subjects.** Every important competitive game, whether it be athletic, as baseball, football, golf, or tennis; or mental, as chess, checkers, or whist, is given full treatment in these volumes. See lists following the articles **AMUSEMENTS; ATHLETICS; PLAY**.

**GAMMA RAYS.** See **RADIOACTIVITY; ROENTGEN RAYS**.

**GAMMA VIRGINIS.** See **VIRGO**.

**GAMMER GRETHEL**, a pen name for the brothers Grimm. See **GRIMM'S FAIRY TALES**.

**GANDER.** See **GOOSE**.

**GANDHI**, *gahn' de*, MOHANDAS KARAMCHAND (1869—), a great nationalist leader of India, whose efforts to secure his country's freedom from English rule, by methods of passive resistance, for a time made him India's most prominent figure and the idol of his countrymen.

Mahatma Gandhi, as he is called (*Mahatma means Great Soul*), was born at Porbandar, in Western India (Kathiawar), the son of a wealthy family of official position. He was sent to England at nineteen, studied at University College, Cambridge, and was called to the bar in London. He started his law practice in India; in 1893, when called to South Africa on business, he decided to remain there to become the champion of the rights of Asiatic settlers in that country. There he first advocated passive resistance to British rule and displayed the asceticism and self-sacrifice which governed his life thereafter.

After 1914, Gandhi returned to India and became a leader of those working for Indian independence; through the World War, how-

ever, he served England loyally. During 1919 and 1920, he proclaimed his campaign of *Satyagraha*, or non-violent resistance to unjust laws, and his policy of non-coöperation. The latter included the boycott of foreign goods,



GANDHI AND HIS WIFE

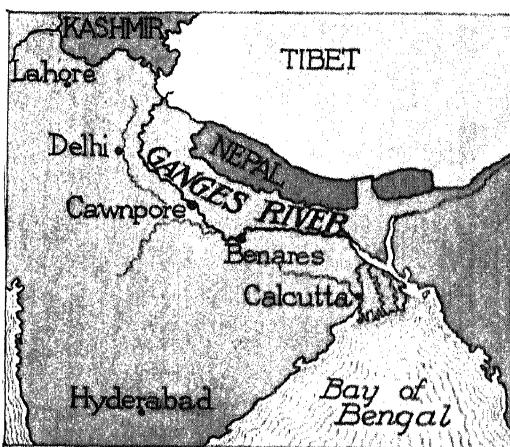
of all government service, courts, and schools, and surrender of all offices, titles, honors, etc. The movement grew rapidly, and Gandhi was soon the leader of the Nationalist movement.

His doctrines enlisted thousands of Indians, both Moslem and Hindu, whose enthusiasm in several cases carried their resistance beyond the passive stage and beyond Gandhi's control. Although he did personal penance for these outbreaks, the reaction had begun even before he was sentenced, in 1922, to a term of imprisonment on the charge of sedition. When he was pardoned because of ill health, two years later, he had lost much of his former power over the people. He retired from public life, but continued to be a source of guidance for many of his former followers. He has made a lasting contribution to the spirit of Hindu nationalism; his high devotion to his cause, his sincerity and simplicity, and his ascetic way of life have made him one of the remarkable figures of his time. See INDIA.

**GANGES, gan' jeez, RIVER**, one of the world's great waterways, and to the Hindus the

most sacred river of India, a stream whose waters, according to popular belief, perform curative miracles and cleanse the body as no other water can. The temples of the holy cities which line its banks are approached by stairs, or *ghats*, direct from the water's edge. At Benares, Allahabad, and other cities, many thousands of pilgrims meet every year for the purpose of bathing in the Ganges and taking home a little of the holy water. It is a popular superstition that whosoever meets death in the river is borne on its waters to Paradise. To the natives of Hindustan, the Ganges represents the great center of religious life. To the modern Western mind, the river appeals as the commercial route down which most of the great wealth of India floats to the sea.

This river, which drains the slopes of the Himalaya Mountains, rises in a vast snow field 10,300 feet above sea level. It issues first from an ice cave, and after a course of 1,557 miles, pours at the rate of about 400,000 cubic feet per second into the Bay of Bengal. Its basin covers an area of over 390,000 square miles of the most fertile and most densely populated country in the world. The Jumna, Ramganga, Gumti, Gogra, Son, and Kusi rivers swell its waters, which in rainy seasons overflow its banks for hundreds of miles of its course. The



COURSE OF THE GANGES

mouths of the Ganges and the Brahmaputra (which see) form the largest delta in the world—a network of dismal jungle and swamp. Calcutta, Patna, Murshidabad, Cawnpore, and Bahar are among the most important cities on the banks of the Ganges.

**GANGLION, gang' gliən.** See NERVOUS SYSTEM.

**GANGRENE** is mortification, or death of the tissues, of a part such as a toe or a foot. In *dry gangrene*, the part turns black and loses all sensation. There is a red zone of inflammation called the zone of *demarcation* in the

non-gangrenous tissue near the gangrene. Theoretically, just beyond this line is where the gangrenous tissue would separate, should the part left come away unaided. In moist gangrene, there is all that has been said of dry gangrene; in addition, there is considerable tendency to the formation of blisters, to oozing of fluid, and to the development of disagreeable odors. In moist gangrene, bacteria of putrefaction are playing a prominent part. This is not the case in dry gangrene.

Among the causes of gangrene are diabetes, plugging of the arteries as a result of senility, freezing and frostbite, bad wounds, and infections. In the days of old, gangrene as a result of infection of wounds was frequently encountered. So bad was it that certain hospitals were sparingly used for operations because of the prevalence of "hospital gangrene" within them.

*Raynaud's disease* is one of a small group of disorders which tend to cause dry gangrene.

W.A.E.

**GANNET**, a large, white sea bird which is often of service to fishermen, because it discloses the location of schools of herring and other fish by following them. It plunges and



GANNETS

dives for fish from the air. Gannets have strong, sharp bills, webbed feet, a small pouch beneath the throat, and are about three feet

long. They make their nests of seaweed on rocky cliffs on Bird Rock and Bonaventure, in the Gulf of Saint Lawrence, and on islets off the British Islands. They are very tame, and the mother will not move off her one pale, bluish-white egg even when a person walks close to her. The young require nearly two

months to complete their growth, and remain mottled brown for three or four years. Certain tropical species of gannet are called *booby* (which see). D.L.

**Scientific Names.** Gannets belong to the family *Sulidae*. The species described above is *Sula bassana*.



GANYMEDE AND JUPITER'S EAGLE  
A statue by Thorwaldsen, in the Thorwaldsen Museum, Copenhagen.

off to Olympus to be his cupbearer. Hebe, the goddess of youth, had always poured the nectar in which the gods often pledged themselves, until one day, on a solemn occasion, she tripped and fell. This accident disgraced her, and she was forced to resign her office. So Jupiter, in the form of an eagle, left Olympus in search of her successor, and flew over the earth until he saw this beautiful youth, the son of the king of Troy. Swooping down, he caught the boy in his mighty talons and carried him back to the top of his mountain, where he was taught his duties as cupbearer to the gods.

**In Literature and Art.** A marble statue, which is a copy of an early bronze statue by Leochares of Athens, representing Ganymede being carried off by the eagle, stands in the Vatican at Rome. Homer says:

And godlike Ganymede, most beautiful  
Of men, the gods beheld and caught him up  
To heaven, so beautiful was he, to pour  
The wine to Jove, and ever dwell with them.

**GAPES**, *gyps*, a disease of young poultry that causes the affected chickens to open their beaks and cough continually. This condition is due to the presence of tiny parasitic worms in the windpipe, in which the parasites feed on blood. If the worms are present in large numbers, they may finally cause the chickens to die from loss of blood. Besides having the poultry relieved by means of a gapeworm

extractor, the owner must thoroughly disinfect their coops and utensils and remove the flock to a new, uninfected range. The old range should not be used for several years, because earthworms are known to harbor the parasites, and it is not safe to brood a new flock on infected land until the range has been plowed, limed, and left idle for a considerable time.

**GAR, gahr.** This name is applied to two different groups of fish, much alike in external appearance, but belonging to separate families.

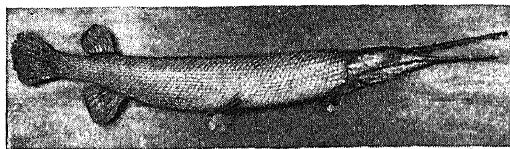


Photo: Visual Education Service

#### LONG-NOSED GAR

Garfish have slender, cylindrical bodies, with the jaws prolonged into spearlike snouts and equipped with strong, sharp teeth. They prey on smaller fish, and are active and powerful. The gar of one group live in the warm parts of the ocean all over the world, and constitute about fifty species. Those of the other group make up five species of fresh-water fish, four of which are found in North America and one in China. The flesh of fresh-water gar is rank and unfit for food. The best known is the *long-nosed garfish*, *gar pike*, or *billfish* of the United States, found as far south as Texas and as far north as Vermont. The *short-nosed gar* has a more northerly range. The largest of this group, the *alligator gar*, sometimes reaches a length of sixteen feet. It ranges from the Southern states into Mexico. L.H.

**Scientific Names.** The ocean gars belong to the family *Esocidae*. The fresh-water gars constitute the genus *Lepidosteus* of the family *Lepidosteidae*.

**GARAGE, gah rahzh'.** This French word has been taken over into English usage without change of form or pronunciation, though the pronunciation *gair'aje* is permissible. Meaning *to keep under cover*, the name is applied to a building where men clean, repair, and store automobiles. The garage is the modern substitute for the old-time livery stable and also for private carriage barn or stable.

**GARAGE POISONING.** See ANTIDOTE (Carbon-Monoxide Poisoning).

**GARCIA, gahr the' ah,** the name of a family of celebrated Spanish musicians and singers, consisting of a father and his son and two daughters.

**Manuel del Popolo Vicente Garcia** (1775-1832), the father, was an eminent vocalist, music teacher, and composer, born at Seville. In 1808 he went to Paris and met with great success in Italian opera. Later he studied the Italian method in Italy, where he duplicated his former triumphs, and then went to London. In 1826 he toured the United States and

Canada with a company of talented singers, among them his son and elder daughter; this event marked the introduction of Italian opera to American audiences. He and his company gave seventy-nine representations, including two of his own operas. He extended his operatic tour as far as Mexico, where he was robbed of his wealth by bandits.

**Manuel Garcia** (1805-1906), son of the foregoing, was especially eminent as a singing teacher. To few men is given the privilege of celebrating their hundredth year of life, but this was granted to Manuel on March 17, 1905, in London, in the presence of over 400 guests distinguished in the scientific and musical worlds. On that occasion, he received decorations from King Edward VII of England, Emperor William of Germany, and King Alfonso of Spain. At the age of twenty, he was well known as a singer, composer, and orchestra conductor. After a successful operatic tour in America as a member of the company with his distinguished father and sister, he returned to Paris and became famous as a teacher of singing. Jenny Lind was one of his pupils. He is famed in the scientific world also, as the inventor of the laryngoscope, the idea for which was gained by the accidental placing of two small mirrors by which he was enabled to note the position of the vocal chords during singing.

**Maria Felicita Garcia** (1808-1836), the elder daughter, possessed a soprano voice of great sweetness and phenomenal compass. When but seventeen years old, she played the leading rôle in *The Barber of Seville*, at Covent Garden, London. Her gifts as an actress were on a par with her beautiful voice, and she made her greatest triumphs in tragedy. She was unhappily wedded to a New York banker, named Malibran, whom she divorced. Later she married a Belgian violinist, Charles de Beriot.

**Pauline Garcia** (1821-1910), the younger daughter, studied singing under Liszt. She gained fame as an operatic and concert soprano, singing teacher, and composer. In 1840 she married Louis Viardot, director of the Paris Italian Opera.

**GARCIA Y INIGUES, gahr se' ah e e ne'-gase, CALIXTO** (1836-1898), a Cuban soldier-patriot who gave thirty years of his life to the cause of the freedom of his native land, and who died on a mission in its behalf. He was born at Holguin, Santiago Province. For a while he practiced law, but in 1868 became a leader in the Cuban insurrection known in history as the Ten Years' War. When General Máximo Gómez was removed from command by the government, Garcia succeeded him as commander in chief. At one time, with a band of only twenty men, Garcia was surrounded by 500 Spaniards. Rather than be captured, he attempted suicide by shooting himself through the head. He recovered, however, and was taken to Spain, where he was held a prisoner for fifteen years. He escaped in 1895, the year of Cuba's final insurrection, and went to the United States, where he engaged in filibustering. Eventually, Garcia succeeded in reaching Cuba and joining the native forces, and soon won important victories as one of the chiefs of the Cuban forces. He died in Washington during a conference on Cuba.

**"A Message to Garcia."** When the United States decided to go to the rescue of Cuba, and war broke out between that country and Spain, one of the first things to be done was to communicate with the insurgent leader, Garcia. No one knew just where he was, and the task was a dangerous one. The way a man named Rowan, without a question which would disclose his identity or arouse suspicion, faithfully delivered that communication to Garcia in the wilds of Cuba, inspired Elbert Hubbard's *A Message to Garcia*. It is an essay which carries an inspiring appeal to loyalty and faithfulness.

**GARDA, LAKE.** See ITALY (Rivers and Lakes).

**GARDEN, ALEXANDER.** See GARDENIA, on this page.

**GARDEN, MARY** (1877- ), a grand-opera star of exceptional dramatic gifts, was born in Aberdeen, Scotland, but became an American citizen in 1924, in New York City. She moved with her parents to Chicago at the age of eleven, where she remained until nineteen; through the aid of friends, she was enabled to continue her musical education. Miss Garden is regarded as practically self-taught, but made much of two years of study abroad; she learned her art upon the stage, for the most part, and her opportunity came quite unexpectedly. Charpentier's new opera, *Louise*, greatly appealed to her, and she learned the title rôle at a time when there was not the slightest prospect of ever appearing in it.

During a performance in Paris, in 1900, she was called to make her professional débüt in the third act of this opera, through the sudden illness of the star, and carried off the triumphs of the evening. Her interpretation



MARY GARDEN

Photo: Moffett

brought instant fame, and within a week, the youthful choir singer from Chicago had become one of the stars of the Opéra Comique and the favorite of Paris. In addition to the rôle of *Louise*, which she has presented over 200 times, she has appeared in many other notable operas, including *Carmen*, *Thaïs*, *La Tosca*, *Salomé*, and *The Juggler of Notre Dame*. In 1921 Miss Garden became manager of the Chicago Grand Opera Company, a post which she held two years. She remained as a star in the company.

**GARDEN CITIES.** See CITY PLANNING.

**GARDEN HYPNOTIST.** See POPPY.

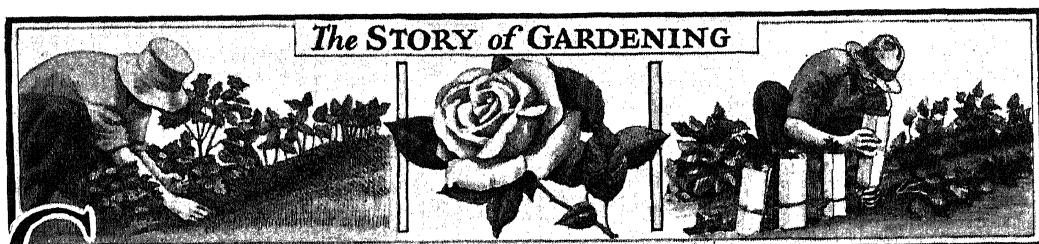
**GARDENIA,** *gahr de' ni ah*, a genus of trees and shrubs of the madder family (*Rubiaceae*), named in honor of Dr. Alexander Garden (1730-1791), an American naturalist born in Charleston, S. C. The plants are notable for the fragrance and beauty of their waxy-white or lemon-colored flowers. The blossoms are funnel- or salver-shaped, and are sometimes mistaken for camellias (which see). Gardenias are popular as florists' flowers, and they are usually seen in greenhouses or conservatories, except in mild climates, for they are native to the tropics and subtropics. At the Cape of Good Hope, the hardwood of two species is much used in the manufacture of farm implements.

B.M.D.



A GARDENIA

**Cape Jasmine.** This is a species that originated in China, but is now common in America. It was first brought to England from Cape Colony. This incident, and the fact that its flowers suggest those of the jasmine, account for the name. The Cape jasmine bears a yellow fruit that is used for dyeing silk in China and Japan. The botanical name of the plant is *Gardenia florida*.



**GARDENING** is the oldest of all the arts. Tennyson calls Father Adam "the grand old gardener," and Shakespeare says, "There is no ancient gentlemen but gardeners." Two

thousand years before Christ, the Egyptians had irrigated gardens; the Babylonians knew the Hanging Gardens of Nebuchadnezzar, one of the Seven Wonders of the World; and in all

countries and ages since, people have made gardens for their use and pleasure (see HANGING GARDENS OF BABYLON; SEVEN WONDERS OF THE WORLD).

Never before, however, has so much attention been given to this delightful and profitable occupation as in the twentieth century. Perhaps some of this interest can be traced to the school gardens which are such an important part of the study course, both in many rural and city districts. Again, the city man's backyard gardening is an attempt to reduce the constantly increasing cost of living, as well as his way of getting "back to the land." So important does the promotion of home and school gardening seem to the United States government, that the Bureau of Education has established a School and Home Garden Division, with experienced teachers in charge, who devote their entire time to investigating and directing garden work in cities.

**Specialized Gardening.** A farmer is a gardener on a large scale. A gardener who specializes in vegetables is usually called a *truck*, or *market*, *gardener*; a specialist in fruit, a *fruit-grower*, or *orchardist*; a specialist in flowers, a *horticulturist*. A *landscape gardener* is an artist engaged by owners of large estates or public-park commissioners, who, instead of working with paints and oils, labors with flowers, shrubs, trees, lawns, drives, and fountains, to paint nature pictures that change with every season, and almost with each hour of the day.

**What a Garden Teaches.** A garden is like a very wonderful school where all the instructors teach by silent but interesting object lessons, and where all the pupils "learn to do by doing." It teaches more practical botany than a nature-study course; but it is not merely botany: it joins hands with the study of birds, bees, and butterflies, insects and plant bacteria, with the lore of the weather and the seasons, the chemistry of the soil, and the use of tools.

A garden is of physical benefit through the healthful outdoor exercise its cultivation affords; and such exercise has an added value because it is really *creative*. Moral education it gives, too, in lessons of tenderness for helpless things; lessons in responsibility, patience, and perseverance, and that vital lesson all must learn—that any success worth having results from work. A garden teaches regard for the rights of others, because a child who has cared for a plant, from its seedtime, understands what ownership means.

A garden is an education in the appreciation of beauty, color, artistic arrangement, and fragrance. It provides a "first course" in the love of Nature. Being such a little corner of the great outdoors, it permits a closer intimacy with Mother Nature than great woods and

rolling stretches of countryside can ever give. Looked at from the purely commercial point of view, a garden is an education in economics. A boy or girl who keeps the home table supplied with fresh fruits and vegetables learns how work changes itself into pennies, which grow into dollars. A garden helps to form the good habit of thrift when its surplus is sold, and the boy or girl is encouraged to put this money in the bank or to spend it wisely. In many families, parents find it a good plan to pay the little gardeners for all produce used for the table, realizing how great an incentive this supplies to steady and enthusiastic work.

**The Site and the Plan.** Whenever there is any choice in the matter of selecting the location of the garden, the important points to be considered are soil and exposure. A southern slope with shelter on the north gives ideal results. At any rate, the garden should be in a free, open space, away from shade and big trees, so that Nature's handmaids—sun and air—may work their magic without interference.

The second thing to decide is what kind of a garden it is to be—whether a vegetable garden, a flower garden, or a combination of the two.

Next comes the making of a "working plan," on paper. This should be a diagram, drawn to scale—say, a quarter of an inch for each foot of space—and should show the exact widths and arrangement of beds, paths, and borders. Whenever possible, the beds should be so arranged that the rows will run north and south, to give the plants the full benefit of the sun from morning till evening. So much depends upon space and purpose that it would be useless to try to present a suggestive plan in this brief treatment. Home-making magazines and special gardening periodicals should be consulted, as well as a few of the many attractive and inexpensive books on the subject; there is no art that has a larger or more fascinating literature.

As to the size of the garden, the beginner must beware of "o'erleaping ambition." Planning and seed-planting are easier than cultivating. A neglected garden may be worse than useless, while even a small plot well tended will yield good profit and endless satisfaction. It is wise to begin on a small scale, find out by experience how much can be well done, and then extend operations from season to season. A small bed for a young child, a plot twenty-five feet square, more or less, for an older boy or girl, will afford excellent training and practice, and from these modest beginnings, the garden may be increased year after year. The novice should confine himself to the common and easily grown varieties, whether among vegetables or flowers. In the flower garden, annuals and vines that grow quickly are encouraging for the beginner. The

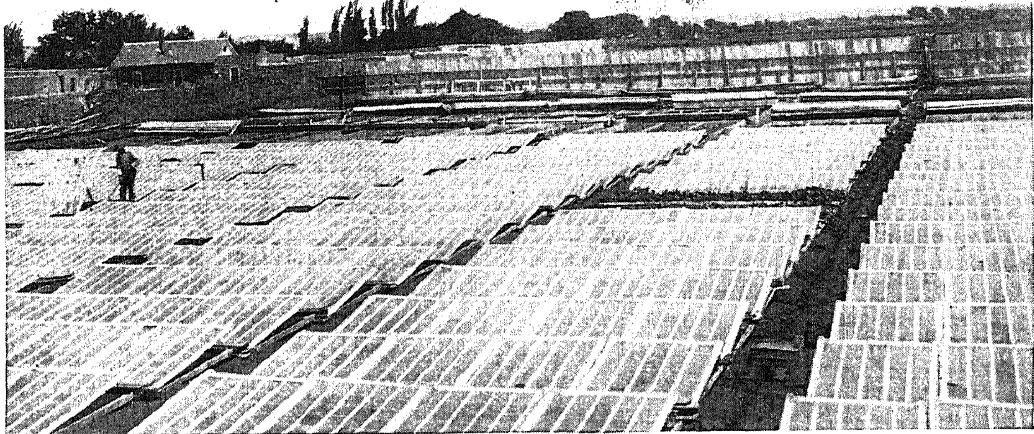


Photo: Visual Education Service

## HOT FRAMES IN A TRUCK GARDEN

Near Las Cruces, New Mexico.

hardy perennials, which bloom year after year, are also a wise choice, especially for anyone whose gardening time is limited.

**Getting the Soil Ready.** If seeds are to be properly nourished when planted, they must be dropped into ground that is well supplied with plant food. One of the most important of these foods is nitrogen, usually given to the soil by spreading over it a coating of stable manure three or four inches deep. Again, if the tiny rootlets are to send their fibers down through the ground for food and moisture, and if the young plant is to push its way upward into the sunlight, the soil must be soft and fine. To make it so, the garden plot must be thoroughly spaded and dug to the depth of a foot. It must then be turned over again and again with hoe and rake, until all lumps are broken up. Spading and raking are to small gardens what plowing and harrowing are to farms. Next, since the soil needs potash and phosphoric acid, as well as nitrogen, to feed to its plants, wood-ash and bonemeal should be sprinkled upon its surface, or one of the good chemical fertilizers sold in the stores should be obtained. By working this in thoroughly, the soil will become pulverized and mellow.

**Planting the Seed.** All planting must be done on a freshly prepared surface; that is, the ground must be watered, hoed, and raked smooth just before the seeds are put into the ground, no matter how much previous work has been done.

Only good seed will produce healthy plants; therefore it should be bought at a reliable seed-house and then tested before planting. A simple testing method is explained in the article on **SEEDS**. The very tiny seeds are usually scattered on the soft ground and pressed in firmly with a smooth board; larger ones are planted at varying depths. During the summer, seeds need to be planted deeper than in springtime, because it is necessary to go farther down to find moist soil.

[The *planting table* in the article **VEGETABLES** gives definite instructions for planting vegetable seeds; a similar one for **FLOWERS** will be found in that article.]

After the planting, the soil must be pressed or stamped down firmly, bringing the earth in contact with the seed, and making it compact enough to hold the moisture needed for germination. Each row or bed should then be tagged with a thin wooden marker, on which are written the kind of seed and the date of planting.

**When to Plant.** Planting time varies in different localities and in different years. Experienced gardeners go according to the fruit-tree calendar. When the peach and pear are in bloom, they plant the hardy vegetables, such as onions, lettuce, radishes, spinach, beets, parsnips, turnips, and the like. When the apple blossoms appear, they plant the more tender varieties, like beans, corn, melons, pumpkins, and cucumbers. Most of the flowers, with the exception of the sturdy little pansy and a few others, also need to be held back until



A VILLAGE BACKYARD AS IT FREQUENTLY APPEARS

this more conservative time. However, if the gardener wishes to get an early start, he plants his seed in a hotbed or cold frame, which is easy and inexpensive to make, or starts it in pots or "flats," kept indoors. Then he waits with his transplanting until the warm weather has come to stay, which is generally when apple-blossom time is past.

**What Cultivation Means.** Cultivating the ground means keeping it well fed, well stirred, and well watered. Occasionally, particularly if the garden does not seem to be thriving, a fertilizer should be sprinkled upon its surface. Different soils need different treatment, but one of the best all-round fertilizers is bone-meal. When manure is used, care must be taken not to let it come in contact with the plant itself. Lime helps to keep the soil sweet. Mulch, a light layer of fine soil kept on the garden surface, assists the ground in retaining its moisture and keeps out weeds; it is secured by hoeing the ground and then dragging a rake lightly over it. Frequent sprinkling with a hose is necessary.

**Protecting the Garden.** Every garden is a battlefield, with the flowers, vegetables, birds, and gardener in league against destructive insects and troublesome weeds. The fight against the weeds must begin the minute they send their unwelcome stalks through the earth, for they are using up food that belongs to the rightful possessors of the soil. The younger they are, the easier to uproot, and if the war is well fought in the beginning of the season, the later struggle will be less strenuous. Constant stirring and mulching of the soil discourage the weeds, and the garden more than repays the time and effort bestowed upon it, by looking trim and yielding abundantly. The United States government has given special attention to the weed problem of farmers and gardeners in its bulletin entitled *Weeds and How to Kill Them*; this pamphlet may be obtained through the Department of Agriculture.

Among the insect foes of the garden are those that actually devour the plant and those that injure it by sucking its juices. The weapon used against the eating insects is poi-

son, such as Paris green or Bordeaux mixture, which is sprayed on the leaves. The sucking insects have to be deluged with liquid or powder; lime, soot, tobacco dust, and kerosene emulsion are among the usual remedies. The cutworm, which comes early and does fearful damage all summer, is best conquered by feeding it poisoned bran mash; the rose-borer is fought with hellebore. The different vegetables have special enemies, each of which is susceptible to certain poisons and not to others.

In a small garden, it is usually possible to keep the insect population down by going over the patch systematically every day, particularly early in the season, picking off the bugs, and dropping them into a can of kerosene. A weedless garden has few insect invaders. And, of course, the birds and toads are constantly coöperating with the garden's owner, so that by encouraging the presence of these allies, he will find his labors greatly lightened. A bird-house and a drinking basin will attract the winged helpers (see illustration, in the article BIRD). A dark, cool corner fitted up with a few stones, or a box lying on its side under a bush, will furnish the toad a home in which he will live contentedly as assistant gardener.

**Making the Garden Pay.** There is profit in gardening, even for a boy or girl who has only after-school and vacation time to give to it. Many an unattractive backyard or empty lot, such as the one shown in the accompanying illustration, which has been a mere dumping-ground for rubbish, has been transformed by the children of the family into a commercial success, like that shown in the second picture. Such a transformation pays cash dividends on time and effort, besides making the home surroundings pleasanter and more healthful.

It is an easy matter to find customers for the surplus garden produce, for there is always a demand for home-grown vegetables and berries. A boy who goes into gardening as a business should concentrate on one or two vegetables; first, in order to have a sufficient output for the market, and, second, because it means less effort and greater returns. When he has mastered these, he can add others to his



THE SAME BACKYARD TURNED TO PROFIT

list. Specializing has good profit in it, however, and many experienced gardeners prefer to devote their entire time to a single crop.

The young gardener may work up a route of private customers in his own neighborhood; he may sell to the town grocers or hotels; or he may dispose of his produce by shipping to outside points. The parcel post offers an ideal rapid-delivery service for garden products. The gardener should consult with an experienced shipper in order to learn how to prepare his vegetables most attractively, and how to pack them in the best way. Good advice is contained in the United States government bulletin on *Marketing by Parcel Post*. Many a boy has in this manner made his vacation pay for the following year's work in college. In addition, there are indirect profits. Prize specimens of garden art often win worth-while cash rewards at state and county agricultural exhibits; and more than one amateur gardener, branching out into general farming, has found his early experience in the home garden a valuable asset.

Girls as well as boys can make money by selling flowers to florists or to people who lack flower gardens, or by raising young plants in hotbeds or flats for supplying neighbors who might not otherwise be tempted to make gardens. Pansy plants, especially when they have begun to bloom, are very quickly disposed of. Seeds and bulbs can be sold in a small way. Boys and girls may also do garden service, charging for their work by the hour and thus turning their knowledge into cash.

Canning and preserving the surplus vegetables and fruits of the garden is a home industry in which women and girls are finding wide scope for profitable work. Some practical

instructions along this line can be secured from the United States Department of Agriculture.

**Related Subjects.** The following articles in these volumes contain much material which will be helpful in connection with the above. A number of these articles contain lists of related subjects, and to those also the reader is referred.

|                        |                             |
|------------------------|-----------------------------|
| Agriculture            | Fruit                       |
| Annuals                | Grafting                    |
| Bird                   | Horticulture                |
| Botany                 | Insecticides and Fungicides |
| Boys' and Girls' Clubs | Perennials                  |
| Breeding               | Plant                       |
| Bulb                   | Pollen and Pollination      |
| Canning Clubs          | School Garden               |
| Cross-Pollination      | Seeds                       |
| Fertilizer             | Soil                        |
| Flowers                | Vegetables                  |
|                        | Weeds                       |



A BOY'S GARDEN PROJECT

**GARDEN OF EDEN.** See ADAM AND EVE; EDEN, GARDEN OF; BABYLONIA; TIGRIS RIVER.

**GARDEN OF THE GODS,** the name given to a 500-acre region in Colorado, between Manitou and Colorado Springs, noted for

its many curiously shaped red and white sandstone formations. Among these are the *Cathedral Spires*, *Balanced Rock*, *Siamese Twins*, and the *Seal and the Bear*. The gateway consists of two masses of red rock, 300 feet high, and only wide enough at the bottom to admit a vehicle. These grotesque masses are the remains of mountains worn and washed away by the winds and waters. A magnificent view of Pike's Peak is obtained from the Garden. (See page 2688.)

**GARDEN STATE,** a popular name applied to New Jersey (which see).

**GAR'DINER, SAMUEL RAWSON** (1829-1902), an English historian, author of numerous historical works of recognized value. His *Students' History of England* and *An Introduction to the Study of English History* are widely



used as textbooks in English and American schools. The most important of his works, marking him as an historian of very high order, are *The History of England from the Accession of James I to the Outbreak of the Great Civil War*, *The History of the Great Civil War*, and *The History of the Commonwealth and Protectorate*.

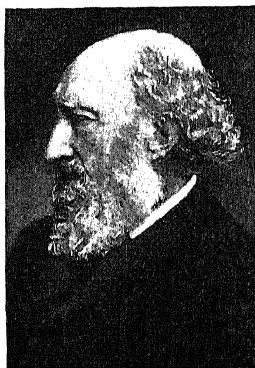


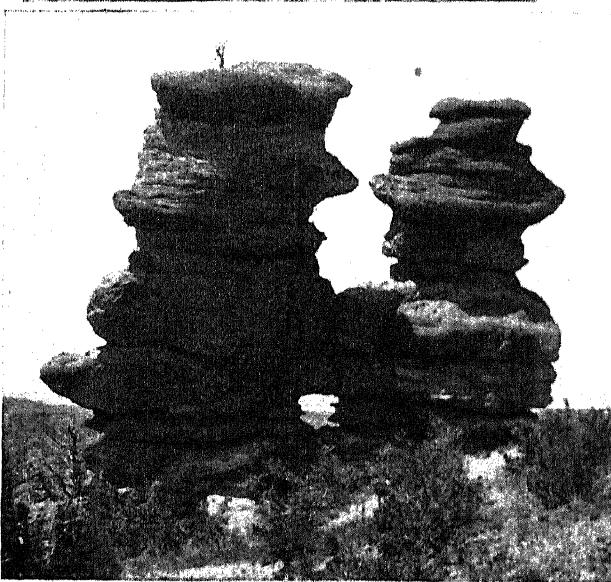
Photo: Brown Bros.

SAMUEL RAWSON GARDINER and *The History of the Commonwealth and Protectorate*.

**GARDNER, MASS.** See MASSACHUSETTS (back of map).

**GAREFOWL, gair' fowl**, the great auk. See AUK.

**GARFIELD, HARRY AUGUSTUS** (1863- ), son of James Abram Garfield, former President of the United States, was born in Hiram, O., and was educated at Williams College, Williamstown, Mass. He has also received honorary degrees from numerous colleges and universities. He began his professional ca-



Photos: P & A; Visual Education Service

**IN THE GARDEN OF THE GODS** A majestic view, with Pike's Peak in the distance. Below, the rocks known as the Siamese Twins.  
(See article on page 2687.)

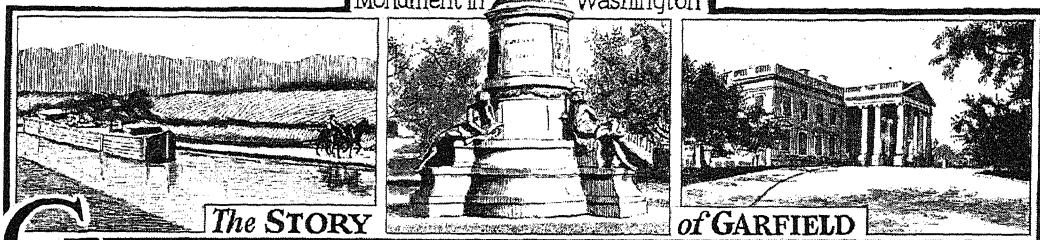
reer as teacher of Latin and Roman history in Concord, N. H., in 1885. After two years he began the practice of law in Cleveland, O., then became professor of politics in Princeton University. In 1908 Garfield was called to the

presidency of Williams College, which post he now holds.

He was appointed as United States Fuel Administrator by President Wilson,

in 1917, and served as long as the war emergency continued, during which time he was on leave of absence from his presidential duties.

Monument in Washington



**G**ARFIELD, JAMES ABRAM (1831-1881), an American soldier and statesman, and the twentieth President of the United States. He was the fourth President to die in office and the second to meet a martyr's death. Garfield was a self-made man, in the very best sense of the word; without great genius, he won high rank in many fields through industry, perseverance, and courage. As a teacher, he kindled in his pupils a longing for truth which led them to regard him as one of the great teachers, to be compared with men like Arnold of Rugby. As a soldier, he rose in two years to high rank, and would have risen higher, but for a call to other duties. In Congress he became the leader of his party, yet he was not as great a party leader as some others of his time, because he frequently sacrificed party expediency to the national good. He was a far-seeing statesman who never lost sight of everyday morality.

As an orator, his own earnest faith made people listen to him with respect, and he never stooped to oratorical tricks. His speeches seldom rose to lofty heights, yet he was always impressive. When he heard the news of Lincoln's death, he spoke a few simple words, from the balcony of the New York custom-house, which calmed a frenzied, horror-stricken mob:

Fellow citizens: Clouds and darkness are around Him; His pavilion is dark waters and thick clouds; justice and judgment are the establishment of His throne; mercy and truth shall go before His face! Fellow citizens! God reigns, and the government at Washington still lives.

Only sixteen years later, he himself, as Chief Executive, met death at the hands of an assassin.

**Youth and Young Manhood.** James Abram Garfield was born in a log cabin at Orange, Cuyahoga County, O., on November 19, 1831. His parents had moved from New York state to the Western Reserve only the year before. Abram Garfield, the father, made a good beginning on his new farm, but died

before the second birthday of his son James. Though James was the youngest of four children, his youth did not prevent him from doing his share of work. At the age of ten, he was accustomed to hard manual labor, and he added his mite to the family income by working at every opportunity for the neighboring farmers. Meanwhile, he had made great progress in his schooling. He read all the books he could buy or borrow, and he especially favored the Bible and American history.

About his fourteenth year, his imagination was kindled by a volume of tales of the sea; he wanted to be a sailor and to live a life of adventure. The quiet routine on the farm no longer satisfied him, and with his mother's permission, he went to Cleveland, where he intended to ship as a common seaman on a lake schooner. He got no farther, however, than the deck of the first schooner he saw, when the captain spied him and urged him to get back to shore. Though somewhat disheartened by his experience, young Garfield determined not to return home without adventure and without money. Wandering about the city in search of work, he met a canal boatman, who hired him to drive his team along the towpath of the Ohio Canal. In later years, Garfield never said much about this experience, but it is known that he was soon promoted from the towpath to a position on the boat. After several months, an attack of ague sent him home, and it seems to have banished any further desire to work on the canal.

It was then the boy's ambition to be a teacher, and with this end in view, he entered Geauga Seminary at Chester, ten miles from his home; then from 1851 to 1854 he studied at the Western Reserve Eclectic Institute, later called Hiram College. In the vacations, he learned and practiced the trade of carpentry, helped on the farms at harvest time, and taught school to earn money for his education. After his first term at Geauga Seminary, he asked for no financial assistance from his mother; he did not need it.

During the three years Garfield spent at Hiram College, he not only earned his way, but he saved \$350 toward the expense of several years at an Eastern college. After hesitating as to Yale, Brown, or Williams, he finally chose the last, chiefly because Mark Hopkins, its great president, wrote him a friendly letter



Photo: U &amp; U

JAMES ABRAM GARFIELD

Of his brief and tragic career in the Presidency, Woodrow Wilson, a later President, in his *History of the American People*, said: "Office seekers swarmed about the President with quite unwonted arrogance, and before he had been four months in his uneasy place of authority one of the crowding throng whom he had disappointed wreaked foul vengeance upon him."

of encouragement. There was some feeling among his friends and the members of his family that Garfield should have chosen Bethany College, in West Virginia, an institution controlled by the Disciples of Christ. Garfield was by nature religious, and he had recently been received into that denomination, of which his mother was also a member. The actual reasons he assigned for his decision against Bethany College revealed the independence of mind which was one of his most pronounced characteristics. In addition to the fact that the course of instruction at Bethany was limited, he said that Bethany was too friendly toward slavery, and, most significant of all,

that as he had "inherited by birth and association a strong bias toward the religious views there inculcated, he ought especially to examine other faiths." Two years at Williams College completed his formal education, and in 1856 he returned to Hiram College to teach Latin and Greek.

Up to that time, Garfield had given no indication of great ability. He was industrious, conscientious, and courageous, but by no means conspicuous for any superiority. He had, however, laid a firm foundation, and within the next seven years was in turn professor, college president, state senator, major general in the United States army, and member of the national House of Representatives. This is a rise to fame paralleled in the lives of but few men.

In 1857, when only twenty-six, he was chosen president of Hiram College. As a teacher, he was remarkably successful, because his own youthful enthusiasm, his thirst for knowledge, and his regard for the truth communicated themselves to his pupils. His classes discussed almost every subject of current interest in science, religion, ethics, art, and scholarship, and felt his influence at every point. He occasionally preached, a practice permitted by his Church, and he was also studying law. At first he seems to have taken no interest in politics, but when the slavery question, which he thought a moral issue, became political, he sought every possible opportunity to oppose it. His prominence among anti-slavery men in Ohio led to his election, without solicitation on his part, to the state senate. There his industry and versatility were again apparent, and he investigated and made reports on such widely separate fields as geology, parliamentary law, education, finance, and the state militia.

**Garfield as a Soldier.** In August, 1861, the governor of Ohio commissioned Garfield lieutenant colonel of the Forty-second Regiment of Ohio Volunteers. Most of the members of the regiment were graduates or students of Hiram College, and were drawn into the army by Garfield's example. Very soon promoted to the rank of colonel, he reported with his regiment to General Buell, then in Louisville, Ky. Buell was so impressed by the efficiency of Garfield's regiment that he gave him the command of a brigade and ordered him to drive the Confederates out of Eastern Kentucky. A fortnight later, Garfield won the Battle of Middle Creek (January 10, 1862), on a field chosen by the enemy, who also had the advantage of superior numbers. This victory, followed by General Thomas's success at Mill Spring, nearly ended Confederate hopes in Kentucky. Garfield's services were acknowledged by the President in a general order to the army, and he was appointed brigadier general. He reached Shiloh in time to take

part in the second day's battle, was prominent in all the operations around Corinth, and showed considerable engineering skill in rebuilding bridges and the fortifications of Huntsville.

During the winter of 1862-1863, Garfield was in Washington as a member of the court which court-martialed General Fitz-John Porter, but in February, 1863, he rejoined the Army of the Cumberland as chief of staff to General Rosecrans. During the Battle of Chickamauga, when a blunder caused the defeat of the Federal right, Garfield rode under fire to carry the news to Thomas, and under Thomas's orders, helped to save the left from rout. For his services in this battle, Garfield was commissioned major general. Shortly afterward Thomas took command of the Army of the Cumberland and asked Garfield to take command of a division. Garfield was only thirty-two, with every prospect of a brilliant military career, but at the earnest request of President Lincoln and Secretary of War Stanton, he resigned from the army and took his place in a new field.

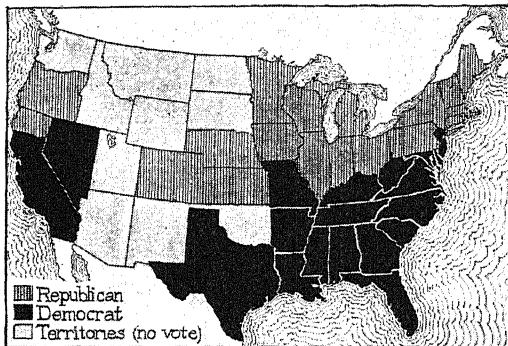
**Garfield in Congress.** In 1862, while still in active service in the army, Garfield was elected to Congress; he took his seat in December, 1863. Lincoln urged him to take this step, with the plea that he could be of greater service to the Union while in Congress than in the army. Garfield's reputation as a soldier secured for him a place on the Committee on Military Affairs, an unusual honor for a new member, for the committee was at that time the most important in Congress. His authority on military matters won quick recognition, and his opinion was frequently sought.

At the close of the war, he was transferred, at his own request, to the Committee on Ways and Means. His reason for choosing this new field was that, the war being ended, financial matters would demand first attention, and he wanted his share in their treatment. His capacity for hard work later won him a place as chairman of the Committee on Banking and Currency and of the Committee on Appropriations. Throughout the Reconstruction period, Garfield was allied with the radical Republicans. He opposed Johnson's policies and voted for his impeachment. He was from the first an advocate of sound money, and never lost a chance to tell Congress and the country the necessity of saving the country's financial honor.

In 1876 he went to New Orleans, at President Grant's request, to watch the counting of the Louisiana vote, and in the next year, although he had been opposed to an electoral commission in the Hayes-Tilden controversy, was himself chosen a member by acclamation. After Blaine's transfer from the House to the Senate in 1877, Garfield became the undisputed leader

of the Republicans in the House. In January, 1880, the Ohio legislature elected him to the United States Senate, but he never took his seat.

**The Election of 1880.** In the national Republican convention at Chicago, in June, 1880, James A. Garfield sat at the head of the Ohio delegation. Ohio sought the nomination of John Sherman, and Garfield presented Sherman's name in a remarkable address. But a large number of delegates were pledged to James G. Blaine, and a still larger number wanted to nominate Grant for a third term.



ELECTION OF 1880

Garfield and Arthur received 214 electoral votes from Republican states; Hancock and English received 155 Democratic votes.

The Grant adherents were the "stalwarts," led by Conkling and Arthur of New York; the opposition to Grant gloried in the name of "half-breeds." For thirty-three tiring ballots, Grant had 306 of the 700 votes in the convention, the remainder being divided among Blaine, Sherman, and George F. Edmunds. Garfield had received one or two votes from time to time, but had not been seriously considered until the thirty-fourth ballot, when Wisconsin gave him thirty-six votes. On the thirty-sixth ballot he received a majority of the votes, and was declared nominated.

In the campaign which followed, Garfield established a new precedent by making speeches in his own behalf in Ohio, New York, and several other states. An attempt was made to connect him with the Credit Mobilier, but no proof of personal corruption was ever offered. That the people at large believed in his innocence was shown by the result of the election, in which he received an electoral vote of 214 to 155 for the Democratic candidate, Winfield S. Hancock, another notable soldier.

**Garfield's Brief Administration.** When Garfield entered office, it seemed that his administration was to be most successful. Both publicly and privately, he announced his desire to unite all factions of his party and of the people in his support, but his hope was not fulfilled. With the exception of Robert T. Lincoln, Sec-

## Outline and Questions on James A. Garfield

### I. Early Years

- (1) Birth and parentage
- (2) Early need for hard work
- (3) Beginnings of an education
- (4) "On the towpath"
- (5) In institute and college

### II. Rapid Rise to Prominence

- (1) Work as teacher
  - (a) Reasons for success
- (2) As president of Hiram College
- (3) Interest in the slavery question
- (4) In the state legislature
- (5) As a soldier
  - (a) Battle of Middle Creek
  - (b) Gallant services at Battle of Chickamauga
- (6) In Congress
  - (a) Work on committees
  - (b) Policy during Reconstruction period
  - (c) Republican leader of the House
- (7) Election of 1880
  - (a) Garfield's place in Republican convention
  - (b) Chosen as compromise candidate
  - (c) Elected President

### III. Administration

- (1) "Stalwarts" and "half-breeds"
- (2) Break with Conkling
- (3) Star Route frauds case tried
- (4) Death at the hands of a disappointed office-seeker

### IV. Summary

- (1) Not a great genius
- (2) Remarkable rise to power due to industry and perseverance
- (3) Rank as an orator

## Questions

What characteristic reason did Garfield give for not attending a college of his own religious denomination?

When did he give up a promising career because he was convinced that he could do more good elsewhere?

What was the motive back of the assassination of the President?

What particular form did the love of adventure take in the boy Garfield? What was the outcome of his search for adventure?

Who were the "half-breeds," and what part did they play in Garfield's brief administration?

In how many fields did Garfield win distinction?

Why may it justly be said that his rise to fame was more rapid than that of almost any other American?

On what important committees did he serve in Congress?

What were Garfield's favorite books when he was a child?

Of whom was his regiment chiefly made up at the outbreak of the war?

Tell how he happened to be nominated for the Presidency.

Give his significant comment on the death of Lincoln.

What led him to take his first interest in politics?

Why did he never take the seat in the Senate to which he was elected?

Secretary of War, his strong Cabinet was composed entirely of "half-breeds," Blaine himself being Secretary of State. The President, however, recognized the stalwart faction in the nomination of about a dozen important officers in New York, all apparently with the approval of Conkling and Platt, the Senators from that state. Then he sent to the Senate the nomination of William H. Robertson as collector of the port of New York. Robertson was one of Conkling's bitterest political foes, and Conkling tried to prevent confirmation. The Republican Senators, yielding to Conkling's wishes, agreed in caucus to allow the nomination to lie over from May until December. This was a victory for Conkling, but the President met this move by withdrawing the dozen nominations which pleased Conkling. Conkling and his colleague, Senator Platt, thereupon resigned and appealed to the New York legislature for re-election to vindicate the right of Senatorial patronage. The legislature refused to re-elect them, and meanwhile the nomination of Collector Robertson was confirmed.

On the morning of July 2, 1881, President Garfield was in a holiday mood. Twenty-five years before, he had been graduated from Williams College, and on this day he was to go back to his *alma mater* for his twenty-fifth reunion. As he was walking through the railway depot in Washington, arm in arm with James G. Blaine, he was approached by Charles J. Guiteau, a lawyer who had sought in vain to be appointed United States consul-general at Marseilles, France. Guiteau suddenly raised a pistol and fired twice at the President, the second shot taking effect. The President was carried to the White House, where he suffered for ten weeks. Toward the end of the summer, his condition became worse, and the doctors decided that his only chance for recovery lay in removal to a more invigorating climate. On the sixth of September he was taken to Elberon, N. J., but blood poisoning developed in about ten days, and on the nineteenth of September, 1881, he died. His body now lies in a splendid tomb in Cleveland, O. Guiteau, the assassin, was a "stalwart" Republican, and when arrested after the shooting, declared frankly that it had been his purpose to throw the government into the hands of Vice-President Arthur. It was apparent, however, that Guiteau was mentally unbalanced and had no conception of the awful nature of his crime, for which he atoned with his own life.

**Eminent Sons.** Two of Garfield's sons achieved distinction in several fields. HARRY AUGUSTUS GARFIELD (born 1863) became a prominent Cleveland lawyer, was professor at Western Reserve University and at Princeton University, and since 1908 has been president

of Williams College, his own and his father's *alma mater*. In 1920 he acted as Fuel Administrator under President Wilson. JAMES RUDOLPH GARFIELD (born 1865) also studied law, was for several years commissioner of corporations in the Department of Commerce and Labor, and from 1907 to 1909 was Secretary of the Interior in President Roosevelt's Cabinet. Since 1909 he has practiced law in Cleveland, O. See GÁRFIELD, HARRY. E.D.F.

**Lucretia Rudolph Garfield** (1833-1918), wife of the second martyred President, whose career in the White House was shadowed by her own illness and ended within four months by the death of her husband. She was the daughter of Zebulon Rudolph, an Ohio farmer. Her father was one of the founders of Hiram College, where she was graduated.

She and James Garfield were classmates, and later, at Hiram College, she was one of his pupils. She taught school while he was completing his education, and when he secured appointment as president of Hiram College, the two were married. It was at Hiram that Mrs. Garfield lived during the long war years, and there that she lost an infant daughter.

Although there was no official entertaining during the four months of Garfield's term as President, the family enjoyed the informal society of their friends. Long residence in Washington as a member of Congress had given to the Garfields and their five children a wide acquaintance. Mrs. Garfield was recuperating from an illness at Long Branch, N. J., when word reached her that the President was shot. Her courage and composure during the long weeks of his illness and at his death aroused the admiration of the country.

**Related Subjects.** The reader who desires additional information regarding this President and his times is referred in these volumes to the following articles:

|                    |                      |
|--------------------|----------------------|
| Arthur, Chester A. | Garfield, Harry A.   |
| Conkling, Roscoe   | Electoral Commission |
| Credit Mobilier    | Reconstruction       |

**GARFIELD, N. J.** See NEW JERSEY (back of map).

**GARFIELD MEMORIAL.** See page 1478.

**GARFISH.** See PIKE; GAR.

**GARGANTUA.** See RABELAIS.

**GARGLE.** When the throat becomes sore, a wash made of simple, soothing, and healing medicines, called a gargle, is used to cleanse and heal the sore part. In using it, the head should be thrown well back, and some of the liquid should be churned about in the lower part of the throat. One must be careful not to swallow any of the liquid, for, even though it may contain simple drugs, the stomach

may be injured. The following are simple gargles for sore throat that can easily be prepared at home:

Salt and borax, one-half teaspoon each; glycerine, twelve teaspoonfuls. Mix in water to make half a pint.

Equal parts of listerine, glycerine, and water.

Salt and baking powder, one-half teaspoon each, in water to make half a pint. Use hot or cold as desired.

**GARGOYLE,** *gahr' goil*. On the upper corners of many ancient Gothic cathedrals and palaces built in the thirteenth and fourteenth centuries, were weird, half-human and half-



Photo: U & U

LUCRETIA GARFIELD

the Garfields and their five children a wide acquaintance. Mrs. Garfield was recuperating from an illness at Long Branch, N. J., when word reached her that the President was shot. Her courage and composure during the long weeks of his illness and at his death aroused the admiration of the country.

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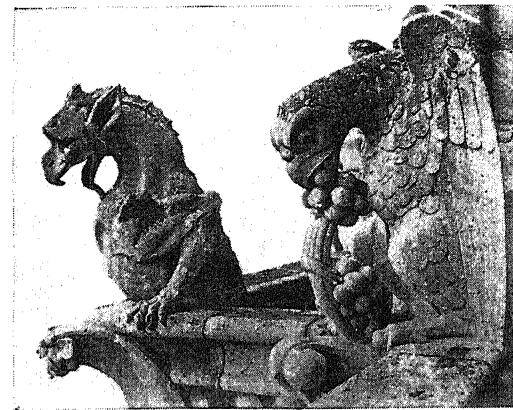


Photo: Visual Education Service

GARGOYLES

Dragon and eagle on the Cathedral of Notre Dame, Paris.

animal or birdlike stone figures called *gargoyles*, sometimes serving as waterspouts. These figures were made on a few buildings earlier than the period named, but they were used extensively in Gothic architecture. On the roof of Nôtre Dame Cathedral in Paris, where they cannot be seen unless ascent is made to the top, are some of the most famous of these strange figures. These grotesque objects have been supplanted in modern styles of architecture by metal pipes which carry the water from the roof and very seldom add any ornament. The University Club building in Chicago, called the most perfect Gothic structure in America, has ornamental gargoyle figures on its upper corners, representing weird animal heads. See ARCHITECTURE.

**GARIBALDI,** *gah re bahl' de*, GIUSEPPE (1807-1882). In his youth and early manhood this Italian hero was a sailor, but at the age of twenty-six he came under the influence of Giuseppe Mazzini and other young enthusiasts of the liberation movement, and he thereupon dedicated his life to that cause. Condemned to death in 1834 because of his share in an unsuccessful outbreak in Genoa, Garibaldi fled to France, and soon afterward made his way

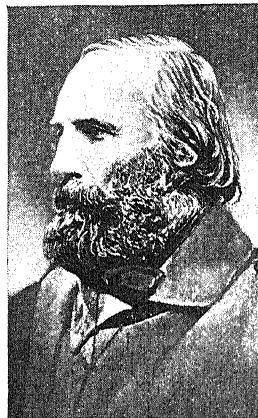
to South America. There he won fame as a brilliant leader in the struggle of the new republic of Uruguay against Argentina.

In 1848 the news of the uprising of the Northern Italians against Austria brought him back to his country, to give heroic but ineffectual service in a struggle that left Italy still in the hands of an oppressor. When this revolution failed, Garibaldi took refuge in Genoa, later reaching Tunis, and after that emigrating to the United States. During the next few years, he revisited South America, but in 1854 he returned to Europe, settling on a small farm on the island of Caprera, in the Mediterranean Sea.

In 1859, when the Italians again struck for liberty under the standard of the king of Sardinia, Garibaldi began the most momentous period of his career. His brilliant and effective services of that year were continued in 1860 in a spectacular conquest of the island of Sicily, which he wrested from the king of Naples with the aid of a band of volunteers. This victory was followed by his triumphal march into the city of Naples. In the words of an eminent historian (Myers), "The adventurous daring of the hero Garibaldi changed the kingdom of Sardinia into the kingdom of Italy." He then resigned his command to the Sardinian king, Victor Emmanuel, and retired to his island farm.

Garibaldi was still far from satisfied with what had been accomplished, and his impatience to see the city of Rome again the capital of Italy led him to make two attempts to capture it. In his second invasion of the Papal States, in 1867, he was defeated by French troops who came to the aid of the Pope, and was made a prisoner. Later, he was permitted to return to his home.

On the outbreak of the Franco-German War in 1870, he took command of a company of French volunteers in Burgundy, and at the end of the war was elected a member of the French Assembly. Meantime, he saw the fulfilment of his hopes in the complete unification of Italy, with the Eternal City the national seat of government. He performed his last public service as a member of the Italian Parliament, to which he was elected in 1874. Garibaldi's place in history is secure. He is honored as a true patriot and hero of the struggle that freed



GARIBALDI

Italy from foreign rule and gave it a place among the modern nations of Europe.

**Related Subjects.** The reader is referred in these volumes to the following articles:

Italy (History)  
Mazzini, Giuseppe

Sicilies, Kingdom of  
the Two  
Victor Emmanuel II

**GARLAND, HAMLIN** (1860- ), an American novelist and poet, whose realistic pictures of Western life present a different West from the romantic country of lawlessness and picturesque wildness about which so many authors have written. His stories are of the new West, an empire that was carved slowly out of the American wilderness. Garland was born in West Salem, Wis., and passed his boyhood and youth in the Middle West. He attended the Cedar Valley Seminary in Osage, Ia., and was a farmer and school teacher by turns until 1884, when he began literary work in Boston. After 1893 he spent several years in the West. He was the founder and first president of the Cliff Dwellers, a Chicago society of celebrities, and he married Miss Zulime Taft, a sculptor of that city.

**Literary Career.** Garland's first book, written between 1890 and 1898, was called *Main-Traveled Roads*. It is a collection of six Mississippi Valley stories, written in a characteristic vein of realism. It was followed by numerous other stories, including *Prairie Folks*, *A Spoil of Office*, *The Eagle's Heart*, *The Captain of the Gray Horse Troop*, *The Long Trail*, *Cavanagh Forest Ranger*, and a trilogy of stories of the Middle Border. He has also written *Crumbling Idols*, a volume of criticism; *Prairie Songs*, a collection of poems; and a sympathetic biography of Ulysses S. Grant.

**GARLIC**, a strongly flavored plant of the lily family, in common use as a seasoning among Italians and other southern Europeans. It is not liked by Americans, except in very small quantities. A bit of garlic rubbed on the inside of a dish will give a salad a noticeable flavor. Like the onion, garlic is very easy to cultivate and is raised from the smaller edible bulbs, or cloves. The leaves of the plant are like those of the onion, but are not hollow. The stem grows about two feet high and bears white flowers. Wild garlic, sometimes called wild onion, is a pink-flowered weed found in pastures in Eastern America. It is much disliked by farmers, for it imparts a very disagreeable flavor and odor to dairy products.



HAMLIN GARLAND

Garlic has been used from the earliest times. It is mentioned in the Old Testament as being part of the food furnished the builders of the Pyramids. The juice of the garlic is also used in medicine. B.M.D.

**Scientific Name.** Garlic belongs to the family *Liliaceae*. Botanically it is a variety of *Allium sativum*, which also furnishes the onion.

**GARNEAU, gahr-noh', FRANÇOIS X.** See CANADIAN LITERATURE (French Canada).

**GARNET.** There are several related minerals of varying composition which are classified as garnet. In color, they range from deep red to brown or black; yellow and green also occur. Among the gem garnets, the most popular is the ruby-red *pyrope*, or *Bohemian garnet*, first found in Bohemia, but now mined chiefly in Kimberley (South Africa), Arizona, and Colorado. It is a silicate of magnesia and alumina, and is often misnamed "Arizona ruby." In South Africa it is sold as the "Cape ruby." The transparent red varieties of the *almandine garnet* are also popular as gems (see ALMANDINE). These and the pyropes are the garnets used as birthstones for January.

Ordinary garnet is ground and used in polishing and cutting other stones, and crushed garnet is sometimes employed instead of sand in making sandpaper. Garnet is hard enough to be serviceable as an abrasive and for watch jewels.

T.B.J.

**GARNISHMENT**, a legal process in the nature of an attachment or execution, by means of which credits, property, or effects of a debtor in the hands of a third party may be held for payment of debts. It is commonly used for attaching the wages of a debtor. See JUDGMENT.

**GARONNE, ga rohn', RIVER**, the most important waterway of Southern France, affords with its thirty-two tributaries a commercial highway extending over 1,400 miles, and drains an area of 38,000 square miles. It rises in the Val d'Aran, on the Spanish side of the Pyrenees, and flows in a northwesterly direction, emptying into the Atlantic Ocean after a course of about 400 miles. A few miles below Bordeaux, the most important town on



GARLIC  
As offered for sale.

its banks, it is joined by the Dordogne, the two streams forming the estuary called the Gironde. Ocean-going steamers navigate inland to Bordeaux, seventy miles from the sea. Smaller vessels reach Toulouse, where the Canal du Midi joins the Garonne and connects the Atlantic Ocean and Mediterranean Sea.

**GARRICK, gair' ik, DAVID** (1717-1779), the foremost of English actors, for a long time manager of Drury Lane Theater, London, and the author of numerous comedies. He studied for a time under the distinguished Samuel Johnson, and then took up law, but his dramatic instinct asserted itself, and in 1741 he made his first theatrical appearance, in the character of Richard III. A notable success was achieved, and his fame as an actor established. Garrick was a Shakespearean enthusiast, and in a large measure was responsible for the revival of Shakespeare's plays in their original form. His last appearance was on June 10, 1776, in *The Wonder*. He died in London three years later, and was buried near the Shakespeare monument in Westminster Abbey. Garrick's acting was distinguished by versatility and naturalness, the latter quality being distinctly opposed to the method of the period. His literary ability was not pronounced, although one of his farces, *The Lying Valet*, was very successful.

**GARRISON, WILLIAM LLOYD** (1805-1879).

In a small chamber, friendless and unseen,  
Toiled o'er his types one poor unlearned young man.  
The place was dark, unfurnished and mean,  
Yet there the freedom of a race began.

Such was the tribute paid to Garrison by the poet Lowell after reading, in *The Liberator*, Garrison's anti-slavery newspaper, the editor's statement: "I will be as hard as truth and as uncompromising as justice."

Garrison was born at Newburyport, Mass. His father, a sea captain, deserted his family, and his mother became a nurse in order to support her children. In 1818 young William entered the office of the Newburyport *Herald* as compositor, and later became proprietor and editor of the *Free Press*, a short-lived paper in which the poems of Whittier, then unknown to fame, appeared. In 1828 he went to Boston and there met Benjamin Lundy, who was publishing in Baltimore the *Genius of Universal Emancipation*, a weekly devoted



Photo: Brown Bros.

DAVID GARRICK

to the abolition of slavery. Garrison was immediately won to the cause and joined Lundy, but, against Lundy's wishes, he urged immediate emancipation for slaves, and the partnership was dissolved.

Garrison then returned to Boston and set up his own press, on which, New Year's Day, 1831, he issued the first copy of *The Liberator*. He was without money or influence, and was editor, typesetter, proofreader, and distributor of the paper. From this time, he was the leader of the anti-slavery agitation, but refused to take any part in politics. *The Liberator* soon attracted attention both in the North and in the South. Hundreds of people threatened Garrison's life; he was finally indicted for sedition, and on



WILLIAM LLOYD GARRISON

October 21, 1835, was dragged through the streets of Boston and lodged in jail for his own safety. Thirty years later, he was presented by his friends with the sum of \$30,000 as a national testimonial to his part in bringing about the abolition of slavery.

A descendant of William Lloyd Garrison, Oswald Garrison Villard, is the editor of the liberal weekly known as *The Nation*.

**GARROTE**, *ga rote'*, or *ga rot'*. In Spain and Portugal, a man condemned to die for a particularly heinous offense is dressed in black, attended by priests, and conducted to a designated place of execution. After the criminal is seated, an iron collar, called a garrote, fastened to an upright post behind him, is placed on his neck and tightened by a screw until he strangles. This is a very painful and inhuman punishment, a revolting method of inflicting the death penalty. It is gradually being superseded by civilization's more humane devices. See **CAPITAL PUNISHMENT**.

**GARTER, ORDER OF THE**. In 1349 King Edward III of England established this order of knighthood, which has become the most famous in Europe. The story is told that, while the king was dancing with the Countess of Salisbury at a great court ball, she lost her garter, and as he picked it up to hand to her, he saw several persons smile and indulge in remarks. This made him angry, and he exclaimed in French, "Shame to him who evil thinks." Then he added that he would make the little blue garter "so glorious that everyone would wish to wear it." Whether or not the story is true, the order was founded, and

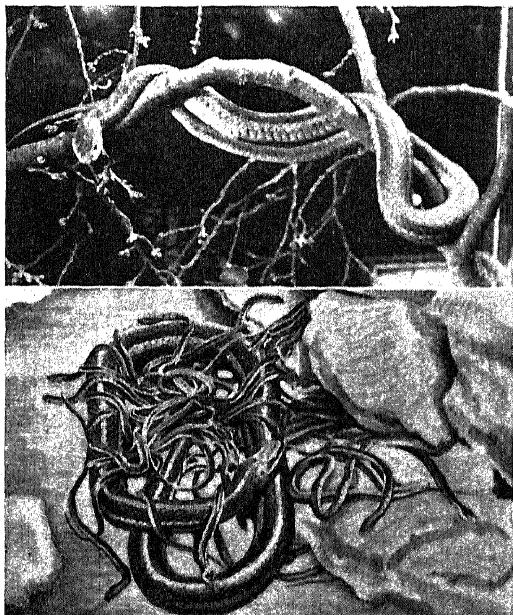
only twenty-five members besides the king were at first admitted.

The emblem of the order is a dark blue garter edged in gold, on which are printed the words which the king spoke, *Honi soit qui mal y pense*. The garter is worn on the left leg



INSIGNIA OF THE ORDER  
(a) The Garter;  
(b) The Star, worn on breast.

below the knee, on all ceremonial occasions. After the order was reorganized in 1831, the membership was increased by including the Prince of Wales and descendants of George I, and any foreign rulers who might be selected. The English monarch is always Grand Master. Though the order has several patron saints, Saint George was considered its special patron, and it is sometimes referred to as "The Order of Saint George." Recently, the membership has numbered about fifty.



Photos: Visual Education Service

GARTER SNAKES

Above, Eastern garter snake; below, a family.

**GARTER SNAKE**, a general term which is applied to various small serpents, the best-known species being the ordinary garter snake

found in the United States, Southern Canada, and the lowlands of Mexico and Guatemala. The length of the adult snake is about three feet, of which from one-fourth to one-fifth belongs to the tail. The coloring varies in different localities. Although its bite is harmless, the snake will assume a threatening pose when attacked. Its strength and courage make it a successful adversary of many small animals whose superior size would seem to give them the advantage. It is partial to grassy places and the borders of streams where mice, toads, and fish abound. The young are produced alive, sometimes fifty or more at a time, and immediately after birth, begin hunting for earthworms. They are carefully guarded, the mother allowing some of them to enter her mouth for protection when threatened by danger.

L.H.

**Scientific Name.** Garter snakes belong to the family *Colubridae*. The common species is *Eutaenia sirtalis*.

**GARY, ELBERT HENRY** (1846-1927), one of the world's greatest business administrators, head of the United States Steel Corporation from its organization in 1901.

Gary was born on a farm near Chicago. Until he was about fifty years old, he was a resident of Wheaton, a Chicago suburb, though in another county, where he served three terms as mayor and two terms as county judge. In Chicago, where he practiced law after laying down his judicial duties, he became general counsel of several large industrial concerns, displaying great organizing genius. He merged several steel mills into the Federal Steel Company, and became its president, with offices in New York City.

Judge Gary desired a steel combination which could compete with Great Britain and Germany, then dominating the steel world. Andrew Carnegie was willing to sell his steel plants for about \$492,000,000, and the giants in the industry took immediate advantage of the opportunity for a master stroke in consolidation. The United States Steel Corporation was formed. Ten large companies joined the merger; the capital stock was \$867,550,394, and the company has since grown to a \$2,500,-



Photo: U & U

**ELBERT H. GARY**  
Head of the greatest steel company in the world, until 1926, when he retired as president and assumed the post of chairman of the board of directors.

000,000 colossus. From its inception, it was the greatest undertaking ever projected in the industrial world. The management of the new corporation was placed upon the shoulders of Gary; he was its president, and during his last years, chairman of the board. So great was the confidence imposed in him, that he was given very nearly absolute control of the company.

Judge Gary was known as a harmonizer in the steel industry. When he became a leading figure in that field, there was bitter warfare among competitors and between employers and employees, but he worked constantly to bring them closer together. In all his efforts, no matter how great the tasks, he was guided by a framed motto that hung in his office: "It can be done." Among his achievements was the establishment of the eight-hour day in his own industry.

His name will be perpetuated in the name of a city which Chicago calls one of its suburbs. Gary, Ind., about thirty miles from the Chicago Loop district, at the southern end of Lake Michigan, was laid out in the shifting sand of a barren region, in 1906, as the location for a mammoth plant of the Steel Corporation. In honor of the part he had taken in building up that organization, the new community was given his name. See following article.

**GARY, IND.**, a city of Lake County and a world center of the steel industry, is situated at the extreme southern end of Lake Michigan, twenty-eight miles southeast of down-town Chicago, and 163 miles northwest of Indianapolis. Fifteen miles east of the city is the 2,000-acre Dunes State Park. Gary, which was named for Judge Elbert H. Gary, chairman of the board of the United States Steel Corporation, is the youngest city of its size in the world. Until 1906, its site was a waste of sand dunes and marshland. In 1905 the Steel Corporation decided to build a city in the Chicago district which would be midway between the ore beds of the North and the coal fields of the South; easily accessible to markets and labor supply; and possessed of transportation facilities by water and rail, and an unlimited water supply. The advantages of the site chosen were apparent, and in 1906 the great Gary steel works and subsidiary buildings began to rise. The city was plotted and quickly developed, and in 1910 had a population of 16,802. In 1928, according to Federal estimate, this number had increased to 89,100. About half the inhabitants are foreign-born.

**General Description.** Gary is built on a level site of sand which once formed the bed of Lake Michigan. Its elevation is twenty feet above the lake level, and 600 feet above sea level. The incorporated city area is 39.96 square miles. A planning commission, appointed in 1919, has worked out a comprehen-

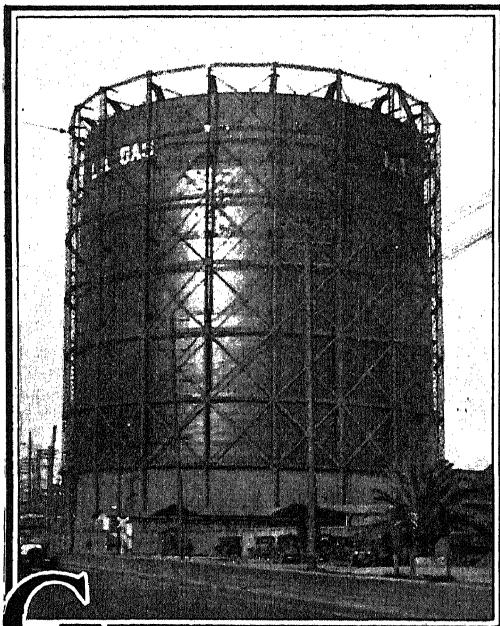
hensive project for the beautification of the city. The widening of streets and boulevards and the improvement of new territory, as it is opened for building purposes, are now completely systematized. The city has over 1,500 acres of public golf courses, parks, and playgrounds. Its modern structures include a million-dollar Municipal Building, part of a plan for a Civic Center; a hotel of metropolitan proportions and equipment; and the Gary Public Schools Memorial Hall, completed in 1928 at a cost of \$500,000.

**Transportation.** Gary is served by trunk lines of the Baltimore & Ohio, the Michigan Central, the New York Central, the Nickel Plate, the Pennsylvania, and the Wabash; by the Chicago Outer Belt and Indiana Harbor Belt lines; and by electric interurban and motorbus lines. It is on several motor highways, including the main routes from Chicago to the Eastern seaboard and the Rocky Mountains.

**Industry.** In addition to the main plant of the United States Steel Corporation, the city has factories for the manufacture of structural steel for bridges, sheet steel and tin plate, automobile accessories, bedding and mattresses, screws and bolts, radiator covers, and portland cement; locomotive, car, and foundry works and a railway-maintenance plant; and other establishments.

**Education.** Gary is world-famous for its educational innovation, the "Gary School Plan," which has been adopted with modifications in many cities. It is a work-study-play system, beginning with the first grade and continuing through high school. The city also operates continuation, adult, evening, and Sunday schools, and university extension.

J.U.N.



**G**AS. In some of the old books on chemistry, we find the following story of the origin of the term *gas*.

The philosophers of the Middle Ages, who are now known as *alchemists*, were troubled by explosions caused by fire coming in contact with invisible contents of the vessels used in their experiments. Not understanding the cause of these explosions, they attributed them to the presence of evil spirits; in the seventeenth century, a Flemish chemist applied the term *geest*, meaning *ghost* or *spirit*, to those invisible vapors, and from this we derive the word *gas*.

All matter exists under one of three forms—solid, liquid, or gaseous; gas is the most elusive of all. Many gases, as oxygen, hydrogen, nitrogen, and carbon dioxide, possess neither color nor perceptible odor, and we can detect them only by their effect upon us or upon some substance placed in them. For instance, if a lighted candle is placed in a jar containing carbon dioxide, the flame will be extinguished. On the other hand, if we fasten a lighted match to the end of a fine steel wire or the mainspring of a watch, and place them in a jar containing oxygen, the wire or the watch spring will burn and throw off brilliant sparks. For these and other reasons, the chemist feels as sure that these and other gases exist, as that wood and stone exist, and by observations and experiments, he has learned a great deal about these unseen substances.

Air is the gas with which people are most familiar. It was by studying air that learned men obtained many hints as to the habits of other gases. They discovered that gas shares certain properties with other kinds of matter. Although it is often invisible, tasteless, and without smell, gas can easily be shown to have weight. It is the pressure of the air, for example, that sustains the column of mercury in the tube of a barometer. Everybody has experienced the push of the atmosphere when the wind blows; it often exerts a force so enormous as to level forests and sweep the masts from ships upon the sea. As compared with liquid or solid substances, gases are very light; water, for example, weighs nearly 800 times as much as air; and air, again, is about fourteen and a half times as heavy as hydrogen, the lightest-known gas.

Early scientists thought of gas as a substance that never lost its airlike quality; it remained for Faraday, in the years 1823 to 1845, to show that this is not true. By applying cold and pressure, he reduced most of the common gases to a liquid state. In 1869 it was shown that carbonic-acid gas cannot be liquefied if its temperature is above 88° F. (31° C.), but that only a moderate pressure is necessary to liquefy it at or below that temperature. It has since been found that for each gas there is a similar *critical temperature*, above which it cannot be liquefied, however great the pressure applied. This accounts for the failure of Faraday and

others to liquefy oxygen, nitrogen, hydrogen, and carbon monoxide. All gases have since been liquefied, and this fact suggests that gas is more like a liquid than a solid, which is true. Both are known to the scientist as *fluids*; that is, both *flow* and are essentially formless, since they will assume any form.

Unlike a liquid, however, gas expands readily to occupy fully any space, however large. To get an idea of the habit of a gas, one may think of its molecules as exceedingly small rubber balls in constant and violent motion. These molecules, so infinitely small that a volume of gas as large as the head of a pin would contain thirty million times as many molecules as there are people on the globe, fly hither and thither in space, jostling one another and striking and rebounding from the sides of any vessel or room that contains them. They deliver a bombardment of tiny blows, which results in the phenomenon we call gaseous pressure. This is the conception of the nature of gases which is commonly accepted among scientists. It is called the *kinetic theory* of gases.

**Boyle's Law.** A seventeenth-century natural philosopher, Robert Boyle, noticed that when gas was compressed into a smaller space, the pressure was increased. He announced that if the temperature of a gas remains constant, the smaller the space the greater the pressure. The pressure, moreover, is in direct proportion to the density; that is, when the external pressure is increased four times, the gas is forced to occupy one-fourth of its original space. It is easy to see why this is so, since the same number of molecules, confined in a narrower space, would deliver their blows against the sides more frequently.

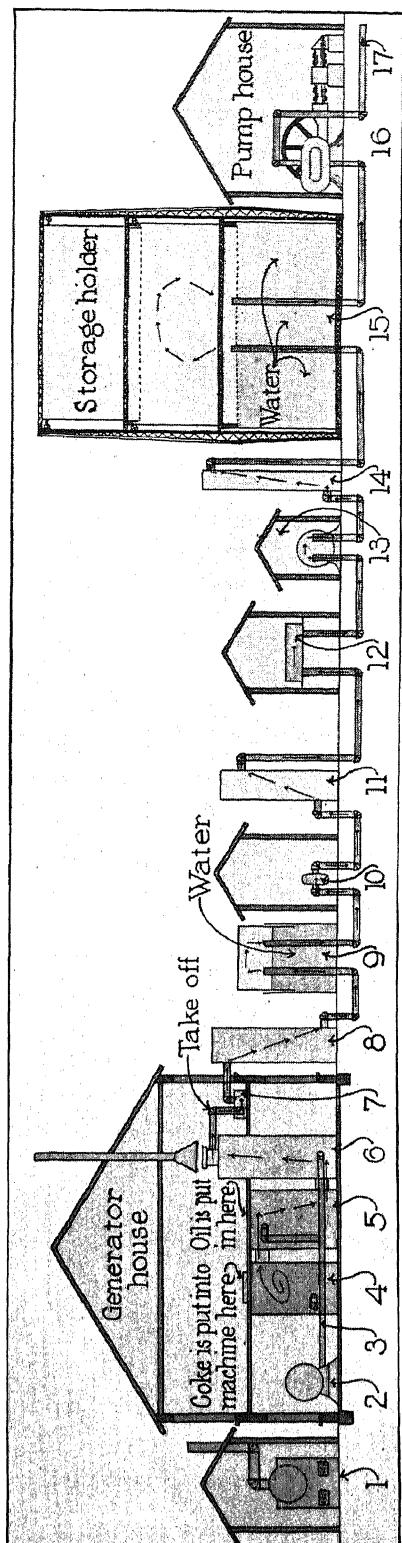
**Charles's Law.** Heat has a surprising effect on gas. It imparts energy to the molecules and causes them to deliver their blows with greater rapidity. This naturally results in a greater pressure in a vessel of the same size; if the walls are movable, the gas will push them out. Thus we say gas expands with heat, just as do nearly all other substances.

A Frenchman named Charles reduced this truth to law by announcing that as long as the pressure remains the same, the space filled by the gas will be increased by a constant fraction of its original volume for each degree of rise in temperature.

All gases obey these two laws with a fair degree of accuracy.

#### Illuminating Gas

Since coal in burning gives off flames, it hardly seems surprising that it should be made to yield a luminous gas. It was not, however, until the close of the eighteenth century that a Scotsmen, William Murdoch, showed in the most conclusive way that an inflammable gas could be extracted from coal. He succeeded in lighting his home and his office in Redruth, Cornwall, England, with such gas. After that it was not long until coal gas began to be manufactured in large quantities for lighting streets and houses.



Key: (1) Boiler. (2) Blast fan. (3) Blast line. (4) Generator. (5) Carburetor. (6) Superheater. (7) Wash box. (8) Condenser. (9) Relief holder. (10) Pipe lines, or mains to consumer. (11) Exhauster. (12) Purifier. (13) Scrubber. (14) Station meter. (15) Storage holder. (16) Pump house. (17) Pump house.

**Coal Gas.** Coal gas is formed by the distillation of coal. This is a rather complicated process, and it is carried out in huge gas plants. It may not be easy to understand at first how a solid can be distilled; the process, in fact, is not exactly distillation in the same sense as we speak of the distillation of water or whisky. What is really done is to decompose the coal into gas and coke, a form of carbon. It is easy to imitate the manufacture of coal gas. Take a clay pipe and fill the bowl with soft coal; stop the mouth of the bowl with clay and allow it to dry well. Blow gently into the pipe to make sure that it is tightly closed by the clay. Then thrust the bowl into a fire. In a short time, gas will issue from the stem, and if a match is touched to this gas, it will burn. Such crudely manufactured gas is full of impurities, but still it is gas. When freed from impurities, it becomes the gas we burn in stove or fireplace.

The first process in making gas is to heat coal in fire-clay retorts. The retorts are oval or D-shaped in cross-section. They are about nine feet long and 16x26 inches across the end, and they will hold from 250 to 350 pounds of coal. After charging, they are tightly closed and heated in a furnace. In these retorts, the carbon compounds of the coal are decomposed. The coke left in the retorts is used as a fuel or for the manufacture of carbons for electric-arc lights. The gas passes off through a pipe, the only exit from the retorts. Gas at this stage of its manufacture contains many impurities, such as tar, sulphur, ammonia, carbon dioxide, and water vapor. The rest of the process is largely one of purification.

The gas leaves the retort and passes to a large U-shaped pipe containing water. In passing through the water, it is freed of much of its tar and ammonia. It is next forced by a rotary pump into a tar extractor, where more tar is removed at a temperature of about 100° F. The gas then passes to what is called the condenser. The condenser is built somewhat like a tubular boiler; the gas passes through a set of tubes in one direction, while water flows in the opposite direction outside the tubes. The gas is then forced by the exhauster (diagram, page 2699) into contact in the scrubber with water in a cylinder containing coke, gratings of boards, or other porous material. In the scrubber, more tar and ammonia are washed out, and the gas is then ready for the purifier. Here it passes through layers of lime or of oxide of iron, and loses any sulphur which it may contain. After this process, it is ready for use, and is stored in huge tanks.

**Water Gas.** Water gas, which is now used in many cities, is so called because it is made by passing steam over red-hot coke or anthracite (hard coal). This gas consists of hydrogen

and carbon monoxide. It burns with a very hot blue flame. In order to render it useful for illuminating purposes, it must be "enriched" with gases that burn with a yellow flame. Frequently it is mixed with coal gas. Sometimes it is enriched by adding volatile liquids derived from coal or from petroleum. On account of the large proportion of carbon monoxide it contains, water gas is extremely poisonous, much more poisonous than coal gas. The added coal or other gas gives a warning odor when there is escaping gas, for water gas is odorless.

**Other Gases.** Other illuminating gases are acetylene (which see); Pintsch, or oil, gas, made from petroleum, and used in lighting railway cars; Blau gas, also made from petroleum; and gasoline gas, made by vaporizing gasoline in a current of air.

T.B.J.

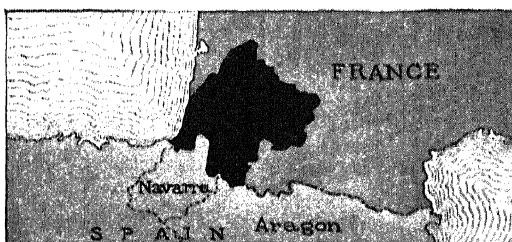
**Related Subjects.** The reader is referred in these volumes to the following articles:

|                   |                            |
|-------------------|----------------------------|
| Acetylene         | Helium                     |
| Air               | Hydrogen                   |
| Ammonia           | Hydrogen Chloride          |
| Argon             | Liquid Air                 |
| Atom              | Molecule (Molecular Force) |
| Carbonic-Acid Gas | Natural Gas                |
| Carbon Monoxide   | Nitrogen                   |
| Chlorine          | Oxygen                     |
| Coal              | Poison Gas                 |
| Coke              |                            |
| Fire Damp         |                            |

#### GASCONADE.

See below.

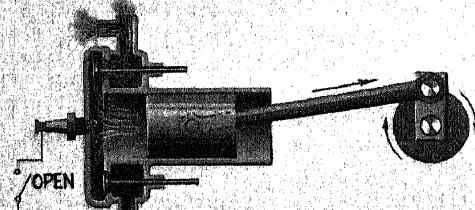
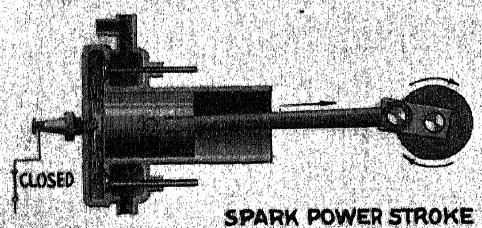
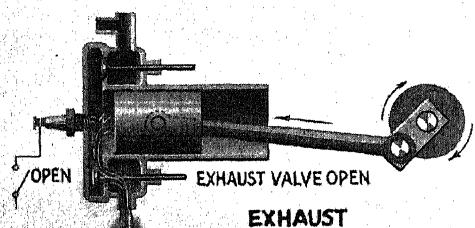
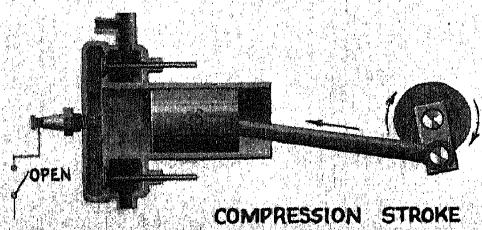
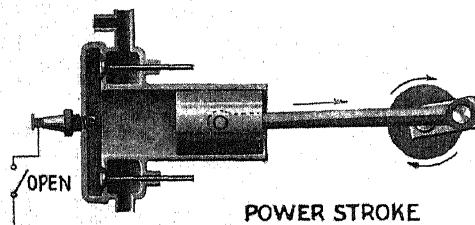
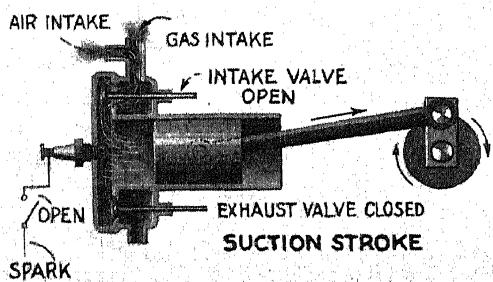
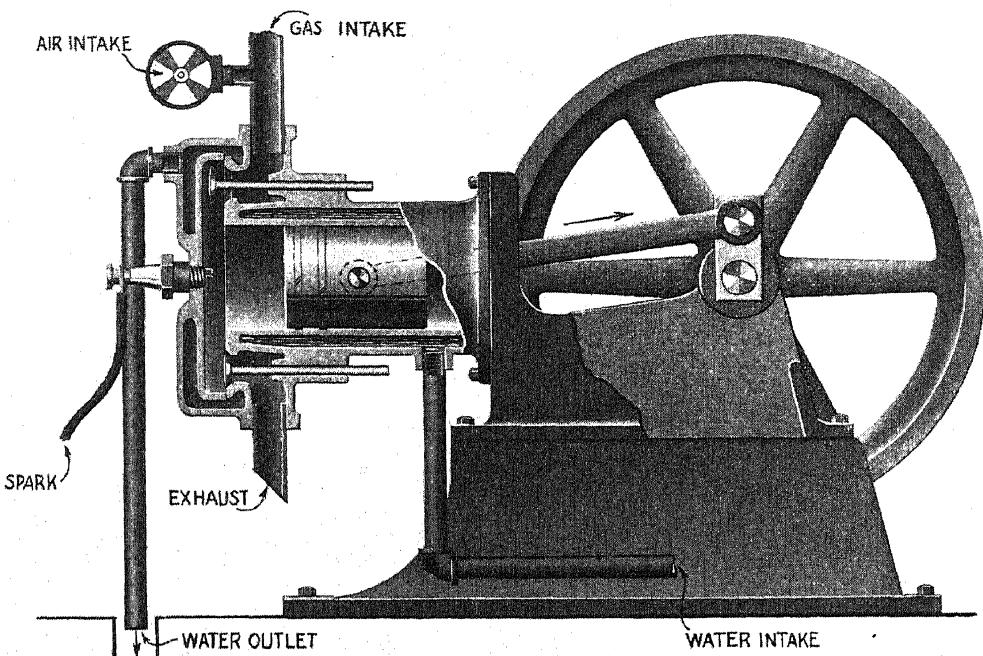
**GASCONY,** an old province of France, north of the Pyrenees Mountains. It took its name from the Vascons, who crossed the mountains from Spain in the sixth century. They long maintained independence, but were finally subdued and ruled over by Frankish dukes. Gascony was the scene of many struggles between the French and English,



GASCONY

who were at last driven out as a result of the victories of Joan of Arc. The Gascons were faithful and brave, but much given to boasting, whence comes the word *gasconade*, which means to brag or bluster. Dumas gives an admirable example of the popular conception of a Gascon in D'Artagnan, the hero of *The Three Musketeers*.

**GAS ENGINE,** an engine in which the motive power is produced by the explosion or combustion of gas in a closed cylinder. It is



also called an internal-combustion engine. Such engines have reached a high degree of development in recent years, and are used for a variety of purposes. They drive automobiles, motorcycles, and motor boats; they are used in factories of many kinds, and they furnish power for churns, plows, tractors, and all sorts of machinery on the farm. Their comparatively light weight and small bulk make them superior to the steam engine for many purposes. A small gas engine, moreover, is practically as efficient as a large one, whereas a small steam engine is much less efficient than a large one. A gas engine is easily operated, and is instantly ready for use. For these reasons, a small gas engine is the most economical and the most satisfactory power-producer, if only a small horse power is required. For large power plants, other forms of power-producers may be equally or more satisfactory.

**Kind of Fuel.** The gas used may be natural gas, coal gas, producer gas, or a vapor produced from gasoline or any other petroleum product. Engines in which gasoline is used—and these are by far the commonest variety—are usually called gasoline engines. They differ from ordinary gas engines only in that the fuel must first be vaporized by means of a carburetor. In stationary engines, either liquid or gas may be used as fuel. In portable engines, such as those used in automobiles and motor boats, the liquid fuels are better, for they are usually cheaper, easier to handle, and easier to obtain than compressed gases in storage tanks.

**The Principles of Operation.** A gas engine is an internal-combustion engine; that is, the combustion occurs inside the cylinder. The first requirement of such an engine is an enclosed space, in which combustion of the gas and the resulting increase of pressure may take place. This enclosed space, or combustion chamber, is the cylinder. One wall of this air-tight, gas-tight chamber must be adjustable, in such a way that the pressure from combustion may be used to perform work. This is accomplished by having a piston fit into the cylinder. When the gas in the chamber is exploded, the piston is forced outward. This outward motion of the piston is controlled by a crank shaft. The crank shaft not only determines the distance the piston goes, but is itself rotated by the force of the piston's motion, and in turn draws the piston back to its original position.

Meanwhile, the condition in the cylinder deserves attention. When the gas in the compression chamber is exploded, by means of an electric spark, the combustion instantaneously raises the temperature of the gas, a temperature of  $1500^{\circ}$  C., or over  $2700^{\circ}$  F., being not unusual. This increase in temperature is accompanied by a tremendous expansion in volume. As the

gas expands, it drives forward the piston with a pressure which may be several hundred pounds to the square inch. The burnt gases then escape through valves in the compression chamber, and a new supply of gas is admitted. When the piston returns, as explained above, by the motion of the crank shaft, it compresses the new supply of gas, and the entire operation is repeated. In a two-cycle engine, there is one explosion for two strokes, forward and backward, of the piston, or for each revolution of the crank shaft. In a four-cycle engine, there is one explosion for four strokes or two revolutions.

**How Ignition or Explosion Is Produced.** In practically all modern gas engines, ignition is produced by means of an electric spark. The current may come from a magneto or dynamo, or from a storage or other variety of battery. The electric spark is made to jump between terminals which are fixed in the mixture to be ignited. These terminals are usually mounted in a spark-plug, which insulates one or both of the terminals, and is so constructed that it can be easily removed and replaced if broken.

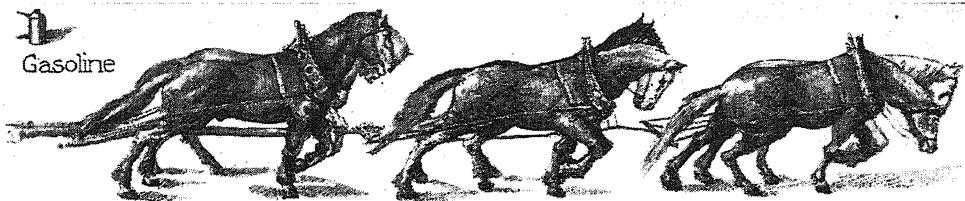
**Capacity of Gas Engines.** The largest single gas engine in existence furnishes 2,000 horse power in its four cylinders. Greater power than this can be obtained by a combination of additional units. The smallest gas engine made has a capacity of only a fraction of a single horse power.

**Related Subjects.** The reader is referred in these volumes to the following articles:

|            |             |
|------------|-------------|
| Automobile | Gasoline    |
| Carburetor | Dynamo      |
| Gas        | Horse Power |

**GASES, EXPANSION OF.** See EXPANSION.  
**GAS HEATING.** See HEATING AND VENTILATION.

**GASKELL, ELIZABETH CLEGHORN** (1810-1865), an English author who is remembered chiefly for two books—*Cranford* and *The Life of Charlotte Bronte*. She was born in London, but spent her childhood under the care of an aunt, in Knutsford, near Manchester. At the age of twenty-two, she married William Gaskell, a minister of Manchester, and twelve years later began to write as a solace for the loss of her only son. A series of sketches, appearing in *Household Words*, for which Mrs. Gaskell wrote in coöperation with Dickens, was published as *Cranford* in 1853. This delightful classic, which portrays with charming realism and delicate humor everyday life in a small village (Cranford is Knutsford), has never ceased to have its circle of readers. *The Life of Charlotte Bronte* is no less delightfully written, and one of the best pieces of English biography. Mrs. Gaskell's other novels are now but little read. They include *Mary Barton*, *Sylvia's Lovers*, *Cousin Phillis*, and *Wives and Daughters* (unfinished).



## THE POWER OF GASOLINE TO DO WORK

Every minute that gasoline is properly employed in an internal-combustion engine it performs as much work as can be done by several teams of horses in an equal length of time.

**GAS LAWS.** See HYDROSTATICS, subhead; GAS (Boyle's Law; Charles's Law).

**GASOLINE**, *gas o'leen'*, a highly inflammable liquid which looks like water, but is lighter and has a characteristic odor. Gasoline is one of the products of petroleum (which see), and in Europe is called *petrol*. It is an exceedingly volatile liquid; that is, it evaporates rapidly on exposure to air. It cannot be kept in wooden barrels for any length of time, for no matter how cold the weather, it forces its way through wood. It must, therefore, be placed in metal receptacles, and the law requires that tanks containing it must be kept underground, except at oil refineries, where it is produced in vast quantities and stored in mammoth tanks above ground.

**Uses.** On account of the high explosive quality of suitable mixtures of gasoline gas with air, gasoline can be employed so advantageously that it has been during recent years the most popular of all fuels for internal-combustion engines. This has been called the "gasoline age," so completely has gasoline superseded other fuels for supplying motive power for automobiles, trucks, motor boats, flying machines, and some forms of stationary engines. Automobiles by the million have made such tremendous demands upon the supply that American production alone has reached the enormous total of nearly 10,000,000,000 gallons each year.

**The Work It Can Perform.** The power it is possible to develop from a gallon of gasoline can accomplish any one of the following: move a ton truck fourteen miles; propel a 3,000-pound automobile twelve miles, at the rate of forty miles an hour; run machinery to milk 300 cows; bale four tons of hay; plow three-fifths of an acre of land; mix thirty-five cubic yards of cement; keep eight electric lights burning for thirty hours.

**How Produced.** Until recent years, gasoline was considered one of the waste products in the refining of petroleum. It was a by-product of kerosene; to-day, kerosene is of secondary importance, and is little used for engine fuel except in tractors. To produce gasoline, petroleum is placed in a closed vessel called a *retort*. Through the agency of heat, gently in-

creased during the process of refining, the petroleum is distilled into its component parts, in the order of their volatility—the naphthas being separated first; benzine, second; and gasoline, which is not quite so light, third. This process is called *fractional distillation*; each component part of petroleum has its own vaporizing point. As the gasoline is separated from the heavier parts of petroleum, it is passed from the retort through a coil of cold pipes, called a *worm*, where it is cooled; it is then passed to receiving tanks.

**Production Figures.** The present annual production of gasoline in the United States is about ten billion gallons. Of this, between twelve and fifteen per cent is exported. The amount produced in Canada is very small, practically all of the supply used in the Dominion being imported from the United States. Canadian consumers get about twenty per cent more in every gallon than do purchasers in the United States, for in the Dominion the standard measure is the imperial gallon of 277.274 cubic inches, while in the American states the gallon is 231 cubic inches.

**Related Subjects.** The reader is referred in these volumes to the following articles:

Automobile  
Distillation

Gas Engine  
Petroleum

**GASPAR.** See MAGL.

**GASPÉ**, *gas' pa'*, PHILIPPE DE. See CANADIAN LITERATURE (French Canada).

**GASPEREAU**, *gas' pur oh*. See ALEWIFE.

**GAS PRESSURES.** See HYDROSTATICS.

**GAS TAR.** See COAL TAR.

**GASTON**, LUCY PAGE, organizer of the Anti-Cigarette League of America (which see).

**GASTONIA**, N. C. See NORTH CAROLINA (back of map).

**GASTRIC INDIGESTION.** See DYSPEPSIA.

**GASTRIC JUICE.** See STOMACH.

**GASTRITIS**, *gas tri' tis*, an inflammation of the stomach. There are at least two forms—acute and chronic. Acute gastritis is caused by the taking of such poisons as carbolic acid, iodine, arsenic, rat poison, phosphorus-match poison, and corrosive sublimate. It may also be caused by alcoholic beverages. In each of these poisonings, the suitable antidote should be

given, and the stomach should be pumped and thoroughly washed. This procedure should be followed by the administration of milk and mucilaginous drinks.

In poisoning by mineral acids and alkalis, the antidotes should be given, and vomiting should be induced, but pumping out should not be done. In all forms of acute gastritis, fasting should be practiced.

Chronic gastritis is generally caused by the prolonged use of alcoholic beverages and other mildly irritating poisons. In addition to indigestion, there is nausea, with vomiting of mucus. Use of alcoholic beverages or other irritants should be discontinued. W.A.E.

**GASTROPOD**, one of a group of mollusks consisting of over 15,000 living species. Among them are snails, slugs, and limpets. These animals live in damp places under fallen trees or decaying logs, and on the bottom of ponds, rivers, and lakes. Great numbers are found along the seashore and at various depths in the ocean, sometimes as far down as three miles. Characteristic features of gastropods are a distinct head, usually provided with tentacles, and a creeping "disk" which serves as a foot. Many of them have a one-valved shell, but in other species, such as the beautiful naked snails found along the coasts, the shell is entirely absent. In others, such as the garden slug, the shell is soft, and buried in the flesh. S.H.S.

**Related Subjects.** The reader is referred in these volumes to the following articles:

Limpet  
Mollusks

Slug  
Snail

**GATE CITY OF THE SOUTH.** See ATLANTA, GA.

**GATES, HORATIO** (1728-1806), an American general in the Revolutionary War, gallant and able, yet so ambitious that he injured his career and disappointed his friends. Gates was born in Essex County, England. He entered the English army at an early age, and was with Braddock and Washington in the disastrous expedition against Fort Duquesne in 1755, where he was severely wounded. He saw other active service in the French and Indian Wars, and after the peace of 1763, settled in Virginia. Upon the outbreak of the War of Independence,

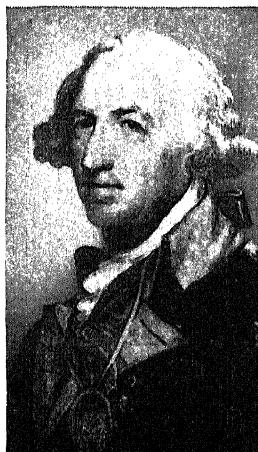


Photo: Brown Bros.  
HORATIO GATES

he was named adjutant general by Congress. As first in command of the American Army of the North, Gates compelled Burgoyne to surrender his entire force at Saratoga (1777), in what has been declared to be one of the decisive battles of the world (see FIFTEEN DECISIVE BATTLES).

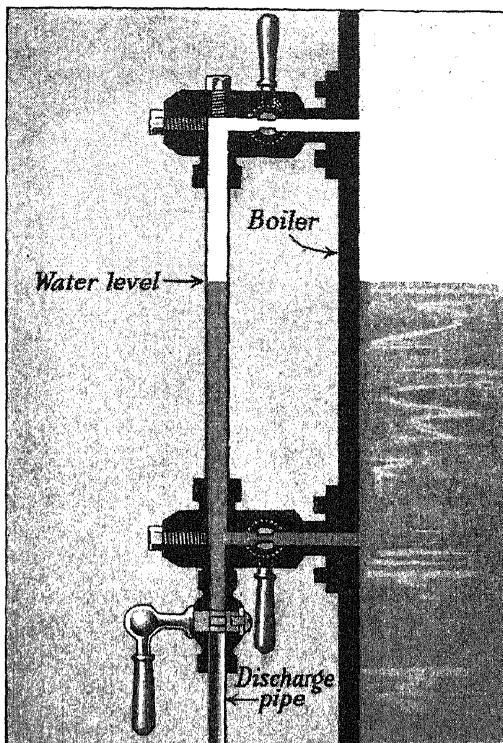
Gates became president of the board of war, and in 1780 was placed in chief command in the South, where he boasted that he would do to Cornwallis what he had accomplished against Burgoyne; in his own words, he was bent upon "Burgoyning Cornwallis." He was totally defeated by Cornwallis at Camden, however, his army was nearly annihilated, and in December he was superseded by Greene. A court of inquiry was appointed to inquire into his military conduct, but after careful investigation, Greene concluded that Gates was not to blame for the disaster, and advised against holding the court. At the close of the war, Gates retired to his estate in Virginia, and in 1790 he removed to New York, where he died. See REVOLUTIONARY WAR IN AMERICA.

**GATEWAY OF INDIA**, a name applied to Bombay (which see).

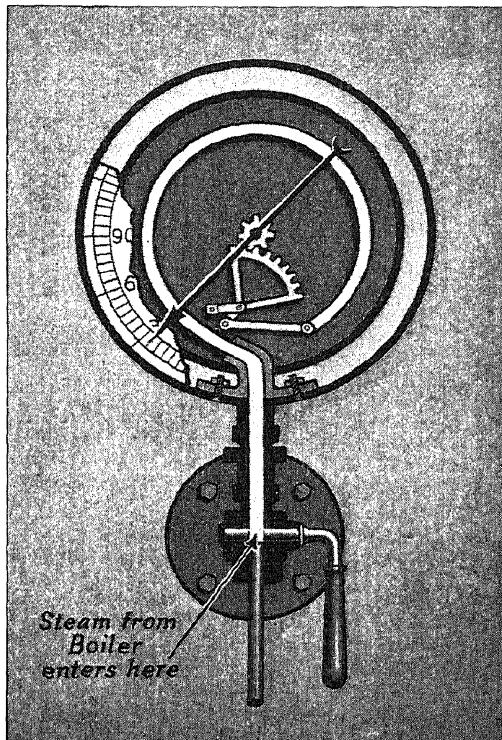
**GATH.** High above the plain, on a hill in the Palestine of Bible times, and surrounded by steep walls, stood Gath, one of the five royal cities of the Philistines. It was a hard place to capture and a very important fortress to hold. Warring nations fought to obtain possession of it, and when David, Hazael, and Uzziah captured it, they destroyed much of value within its gates. Gath was the home of a strong race of men, among them Goliath, who grew to manhood in this city and whom David slew. At present, a small village is all that is left of the once famous city. In David's lament for Saul and Jonathan (*II Samuel* 1, 20), he says, "Tell it not in Gath, publish it not in the streets of Askalon," for he fears that the daughters of the Philistines will rejoice over the death of these two great men. The expression, "Tell it not in Gath," is to-day used to mean, "Keep it secret." See PHILISTINES.

**GATINEAU, gah te'no', RIVER.** See QUEBEC (Rivers and Lakes).

**GATLING GUN**, a quick-firing machine gun, the original from which the most effective of the smaller weapons used in modern warfare have been evolved. It was invented by Richard Jordan Gatling during the War of Secession in America, and was afterward adopted by all modern armies. The original Gatling gun was practically a revolving rifle with ten barrels fired in turn. It had a capacity of 350 shots a minute, and was easily moved from place to place. Although superseded by the Maxim and other machine guns, the Gatling gun possessed a few features that have not been improved upon by more recent inventions. See MACHINE GUN.



WATER GAUGE



STEAM GAUGE

**Richard Jordan Gatling** (1818-1903) was born in North Carolina. He showed great mechanical skill as a child, and in young manhood assisted his father in perfecting a machine for sowing cotton seed. He also invented a hemp-breaking machine and a steam plow. The United States Congress voted him the sum of \$40,000 to experiment in new methods of casting cannon. His greatest invention was the Gatling gun.

**GATUN LOCK.** See PANAMA CANAL.

**GAUCHOS**, Spanish and Indian half-breeds. See ARGENTINA.

**GAUGE, OR GAGE, gaje**, a mechanical appliance for registering the force of steam or the depth of water in boilers. The steam gauge consists of a metal box with a dial, over which an indicator, or needle, moves. Steam from the boiler enters a tube in which is a flat piece of metal connected with the needle by a rod and spring. The pressure of steam acts on the needle, forcing it round the dial face to indicate the pressure in pounds. Exactly the same principle is found in the ordinary spring scales used in grocery stores. A water gauge consists of a vertical glass cylinder connected with the boiler by metal tubes. The height of the water in the cylinder indicates the level of the water in the boiler. See BOILER.

**GAUL, gawl**, an ancient country, in the main identical with France, though larger than that

country at present. Every schoolboy who begins the study of Latin becomes familiar with the name, for Caesar's famous *Commentaries* opens with the oft-quoted sentence, "All Gaul is divided into three parts." Caesar then goes on to describe these three parts and the people that dwell in them, who "differ among themselves in customs, in manners, and in language"—the Belgae, the Aquitani, and "those who in their own language are called Celtae, in ours, Galli." Caesar was not the first of the Romans to come in contact with the Gauls. Centuries before, the Gauls, whose territory extended from the North Sea to the Alps, had crossed that mountain barrier, swept down through Italy, and sacked and burned Rome (390 B.C.). The northern part of the peninsula they continued to hold, and thus there came into existence a *Cisalpine* or "this-side-the-Alps" Gaul, as distinguished from *Transalpine* or "beyond-the-Alps" Gaul. In the third century B.C., other tribes invaded Greece and Macedonia and finally crossed into Asia Minor, where, under the closely similar name of *Galatians*, they long retained their racial characteristics.

Even brave and warlike as they were, the Gauls were no match for the organized forces of Rome, which began to force them little by little farther and farther northward, until

at last they passed out of Italy altogether, or submitted and became peaceful subjects of the republic. Still they were too powerful, however, for Rome to desire them as neighbors just beyond the Alps, and Roman invasions into Transalpine Gaul began. During the second century B.C., the Romans made themselves masters of the strip along the sea, from the Alps to the Pyrenees, but not until the time of Julius Caesar did all Gaul come under Roman sway. From 58 to 50 B.C., Caesar carried on one campaign after another, and the battles were hard-fought, for the Gauls were no unworthy adversaries. "The bravest are the Belgians," wrote Caesar, and this tribute, in its original Latin form of *Fortissimi sunt Belgae*, was the inscription chosen for the proposed monument to the Belgians after the World War. The popular name for the part of Gaul won for Rome by Caesar was "Long-haired Gaul," because the Gauls did not keep their locks shorn.

During the time of Augustus, Gaul became an integral part of the Roman Empire and was organized in four provinces; this division



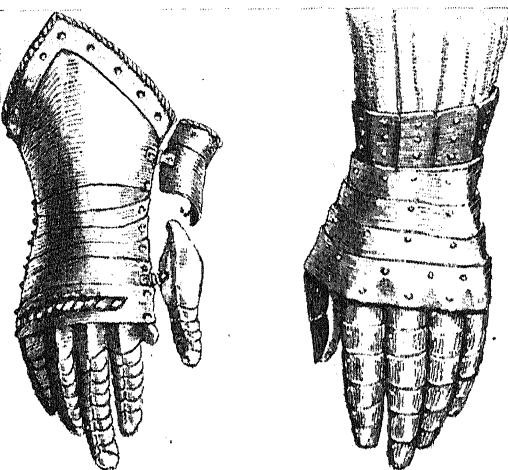
GAUL

Boundaries at the time of the greatest extent of the Roman Empire, about A.D. 115.

persisted for four centuries. Later the history of the Gauls merged in that of other peoples—the Goths, the Burgundians, and the Franks; and in time, out of the conflict the modern French nation was born. See FRANCE (History); FRANKS.

**GAUNTLET**, *gahnt' let*. In the thirteenth century, knights and soldiers began to wear a heavy leather glove covered with little plates of iron to match the rest of their armor. These were called *gauntlets*, and they were used throughout the Middle Ages. When a man in medieval times considered that some one had

wronged him, he would at once throw his glove, or gauntlet, down before him. The enemy, if possessed of the spirit of his day,



GAUNTLETS OF THE FOURTEENTH CENTURY

would pick it up, as it was a challenge to fight, and the two men would arrange a time for battle. The battle was regulated by fixed rules and was considered a legal trial. Whoever won was thought to be in the right, for it was believed that God gave the innocent strength to defeat the guilty.

**Present-Day Application.** We still hear people use the expression, "throw down the gauntlet," which means "declare a challenge." Any glove with a long, loose wrist extension is called a gauntlet glove.

**GAUR**, *gowr*, or **GOUR**, a wild ox of India, supposed to be the largest existing species of wild cattle. Specimens have been found whose horns measured thirty-nine inches in length by nineteen around at the base. This, however, exceeds the average. The gaur is shining, blackish-brown in color, with pure white lower legs. It is a most desirable object of rifle sport in India, must be stalked on foot, and when cornered, is extremely ferocious. Notwithstanding its fierceness when charged, it rarely attacks human beings except in self-defense. The semicivilized hill tribes of India have tamed it to a certain extent, although it has never been fully domesticated.

**GAUTAMA**, *gou' tah mah*, the family name of the founder of Buddhism (which see). See, also, ARNOLD, EDWIN.

**GAUZE**, *gawz*, a light, transparent fabric originally made of silk, but now manufactured from linen or cotton, the characteristic feature of which is its openness of texture. The word is apparently of Eastern origin, related to the Persian *gazi*, name of a thin, coarse, cotton cloth; but another supposition is that it takes its name from the Syrian city of Gaza, where it is said to have first been made. The open tex-

ture of gauze is due to the manner in which it is woven; the warp threads (those that run lengthwise of the cloth) are not only crossed as in ordinary weaving, but are twisted in pairs alternately from left to right and from right to left, after each shot of the weft threads (those that run crosswise). In this way, the weft passes through a succession of loops in the warp, and the threads are kept at equal distances apart, at the same time being held firmly in place.

Gauze fabrics are plain, figured, or striped. At the present time, China produces many choice gauzes, worked with flowers of silver or gold on a silk foundation. Cotton gauze, made especially for the use of surgeons, is valued for antiseptic purposes. Light knitted under-garments of silk, linen, and cotton are sold under the name of gauze underwear. The term is also frequently applied to bolting cloth, used for sifting flour, and to the finely woven wire cloth employed in window screens, sieves, and safety lamps.

**GAVIAL**, *ga' vial*, a fish-eating crocodile of Northern India, which inhabits chiefly the



THE GAVIAL

basins of the Ganges, Indus, and Brahmaputra rivers. It is distinguished from true crocodiles by the length and slenderness of its muzzle, characteristics which vary according to age and sex. It has numerous long, recurved teeth, usually more than one hundred, especially adapted to its exclusive fish diet. It reaches a great size, often twenty feet in length, but owing to its slender and weak mouth and jaws, it is considered less dangerous than a crocodile of smaller proportions. Its feet are webbed, and it spends a considerable portion of its time in the water. L.H.

**Scientific Name.** The gavial belongs to the family *Gavialidae*. Its scientific name is *Gavialis gangeticus*.

**GAVOTTE**, *ga vot'*. Among the peasants in France there originated a merry, light dance which was so well thought of that it was introduced at court in the sixteenth century. It received the name from the Gavots, the people among whom it originated. At first, the gavotte, in  $2/4$  or  $4/4$  time, was a bright, happy dance, but later it became a stately, formal affair. As a theatrical dance, it became very effective and popular, and was worked out in many ways by Glück and Grétry. As a modern dance, it is not popular in society, where it is becoming almost unknown, but is seen frequently on the stage.

**GAY, JOHN** (1685-1732), an English poet, famous for his *Beggar's Opera*, which was first acted in 1728. It ran for sixty-three nights, at that time a most remarkable achievement. In 1713 he published *Rural Sports*, which was followed by several pastoral poems, in 1714, dedicated to Alexander Pope. This was the beginning of a lasting friendship between the two. Gay died in 1732 and was buried in Westminster Abbey. Pope wrote his epitaph, which is followed by a couplet of Gay's own:

Life is a jest, and all things show it,  
I thought so once, and now I know it.

**His Work.** Gay had a great many patrons, and in 1720 he published *Poems on Several Occasions* by subscription, on which he realized £1,000, or \$5,000. In 1715 his burlesque tragedy, *What d'ye Call It?* appeared, followed by *Trivia, or The Art of Walking the Streets of London*. A tragedy, *The Captives*, produced some years later, met with some success, and *Fables*, in verse, helped also to increase his reputation.

**GAY-LUSSAC**, *gay lu sahk'*, JOSEPH LOUIS (1778-1850), a French chemist and physicist, and one of the most noted scientists of his day. He was an enthusiastic investigator of volcanic eruptions, having visited Vesuvius when it was in full eruption in 1805. He was also a fearless aeronaut, and did not hesitate to make an ascent 23,000 feet above sea level in a balloon, to make observations of magnetism and also of the temperature and humidity of the air. His most important discovery was that oxygen and hydrogen unite in proportions of one to two to form water. This led to one of the most important discoveries ever made in chemistry, that of the law of volumes.

Gay-Lussac's services to industry included his improvements in the processes for the manufacture of sulphuric acid and oxalic acid; methods of ascertaining the amount of real



Photo: Brown Bros.

JOHN GAY



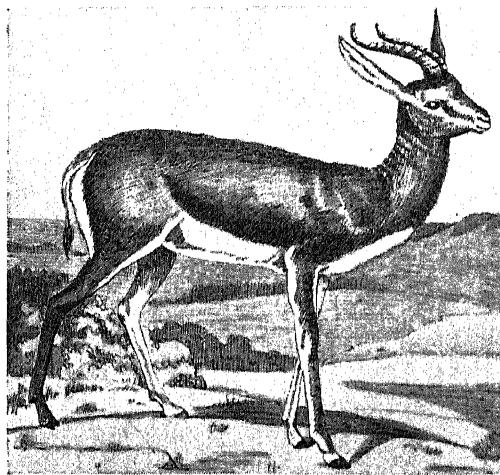
Photo: Brown Bros.

GAY-LUSSAC

alkali in potash and soda, by the volume of standard acid required for neutralization; and for estimating the available chlorine in bleaching powder, by a solution of arsenious acid. He also elaborated a method of assaying silver by a standard solution of common salt. Owing to the great benefits resulting from his experiments and discoveries, Gay-Lussac was the recipient of many honors, and in 1839 was made a peer of France.

**GAZA**, *ga' zah*, an ancient town of Syria, fifty miles southwest of Jerusalem and three miles from the Mediterranean Sea. It is mentioned in the Bible as the scene of several of Samson's exploits. He carried away the gates of the city, and destroyed his enemies by pulling down the temple (see *Judges* xvi). The Philistines captured the city from the Egyptians and made it their chief stronghold. It was taken by Alexander the Great, and later became an important Greek city. Now called Ghazzeh, it is an important commercial center with extensive manufactures of pottery and a large trade with Arabia, Persia, and Egypt, carried over caravan routes. Gauze (which see) is possibly so called because first made in Gaza. See SAMSON; ALEXANDER THE GREAT.

**GAZELLE**, *ga zel'*, a small, slender antelope to whose beauty, grace, and gentleness frequent allusions are found in poetical works.



THE GAZELLE

There are about twenty-three species, confined to the north side of the Atlas Mountains, Egypt, Abyssinia, Syria, Arabia, and South Persia. Some inhabit mountain ranges, others sandy plains. The common light-brown gazelle, which is about two feet in height, and frequents rocky and desert lands, is sometimes called *ariel*, or *dorcas*, and is easily tamed. It is a favorite pet of wandering Arabs, the name *gazelle* originating from an Arabian word meaning to be affectionate.

Gazelles in general are animals with large, soft, and lustrous black eyes and round, black horns, some ringed, others plain, and found on both sexes; the ears are long, narrow, and pointed; the tail is short, and the animal has smooth, short hair. There is a tuft of hair on the knees of some species. A common species has a light fawn-colored back, deepening into dark brown in a wide band which edges the flanks and forms a line between the upper parts of the body and the pure-white abdomen. Gazelles are very fleet-footed and cannot always be caught, even by the swiftest greyhounds. Falcons are often used in hunting them, or enclosures to trap them are made near their drinking-places.

These attractive little animals feed on vegetation. A Sahara species, *Loder's gazelle*, is said to feed on berries and leaves and never to drink. *Grant's gazelle*, which stands about thirty-four inches high at the shoulder, has longer horns than any other species; the ordinary length is about ten inches, but the horns of the male Grant's gazelle reach a length of thirty inches. Another species is the light chestnut-colored Indian *chinkara*, or *ravine deer*, of Asiatic plains. See ANTELOPE.

W.N.H.

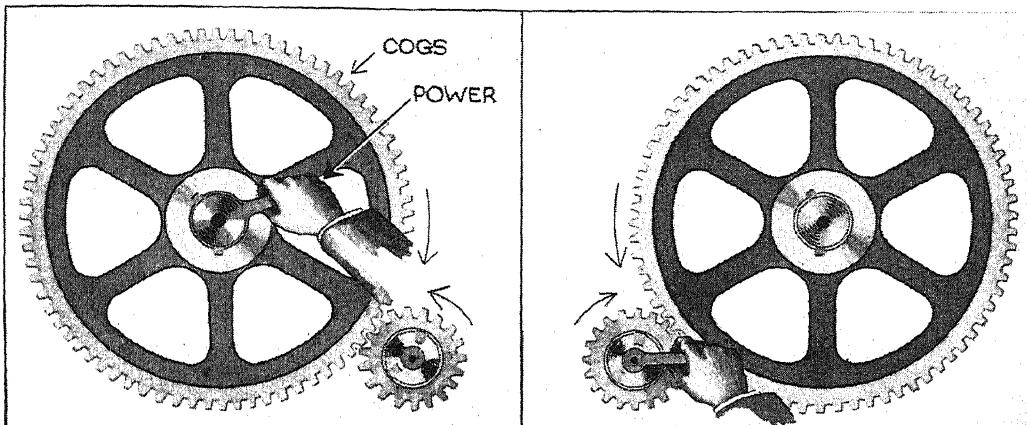
**Scientific Names.** Gazelles belong to the family *Bovidae*, and to the genus *Gazella* and allied genera.

**GAZETTA.** See NEWSPAPER (Historical).

**GDYNIA**, *de' ne ah*, a new Polish ocean port. See DANZIG, subhead; POLAND (New Ocean Terminal).

**GEARING**, *geer' ing*, a general term descriptive of mechanical appliances by means of which motion and power are communicated from one part of a machine to another. There are numerous forms of gear, the most common being cog wheels, endless belts, screws, or worm gear, friction wheels, and eccentrics. Gear may be adapted to increase speed in the machinery to which the power is transmitted, or to give slower motion; these are known as *multiplying* and *retarding* gear, respectively. In *spur* gearing, the teeth or cogs are arranged at regular intervals and with even depth round the surface of the wheel. *Beveled* gearing is made with the teeth running vertically on a wheel shaped like the base of a cone, and is used when shafts are at right angles to each other. Worm gear operates on the principle of the endless screw. When the gearing between two parts of the machinery is out of order, or purposely disconnected, the machine is said to be *out of gear*. It is *in gear* when connection is established. See SCREW (Endless Screw); also, AUTOMOBILE, for explanation of gear-shifting.

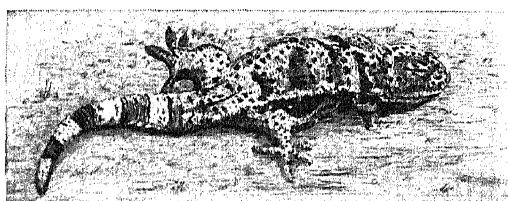
**GEARY ACT**, a law relating to Chinese exclusion (which see).



PRINCIPLE OF GEARING

At left, large wheel driving a smaller one; right, small wheel driving a larger one. (See article, page 2708.)

**GECKO**, *gek' oh*, so called because of the peculiar cry, like *gecko*, uttered by some of the species, is a lizard of small size and repulsive appearance. It has a flattened head, a short, thick body which drags on the ground when the



THE GECKO

creature walks, a thick tail, and adhesive feet which enable it to climb vertical walls or even move along a ceiling, upside down. It feeds chiefly on insects, and is more or less active at night. Geckos are found in warm climates, and are widely distributed throughout the world. They are generally regarded with disfavor, as being poisonous and carriers of disease, but there is no evidence to support such an opinion. See LIZARD.

L.H.

**Classification.** Geckos belong to the family *Geckonidae*. They are divided into numerous genera and species.

**GEDALIAH**, *ged a li' ah*, a governor of Judah. See JEREMIAH.

**GEDDES, SIR AUCKLAND CAMPBELL** (1875- ), a British educator and statesman, appointed ambassador to the United States in 1920. He was for a time professor of anatomy at McGill University, Montreal. During the World War, he was in charge of recruiting in England, and from the close of the conflict to 1920 held minor posts in the British Cabinet, under the premiership of Lloyd George.

**GEGENSCHEIN**, *ga' gen shine*. See ZODIACAL LIGHT.

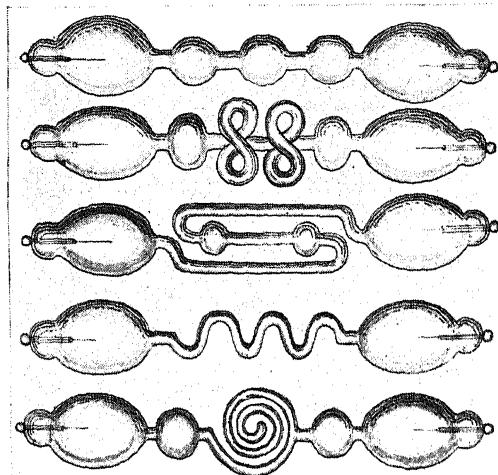
**GEHENNA**, *ge hen' ah*, the valley of Hinnom, just south of Jerusalem, where children, long before the Christian Era, were burned to death as offerings to Moloch, a heathen deity. From the terrible suffering and sorrow connected with the valley, its name, which is an abbreviated form of two Hebrew words, *ge-hinnom*, meaning *valley of Hinnom*, grew to mean a place of eternal punishment, or hell. In ancient descriptions of hell, the awful scenes in this valley were used as a foundation. King Josiah caused the valley to be used for sewage and other refuse, "that no man might make his son or his daughter to pass through the fire to Moloch" (*II Kings XXIII, 10*). See HELL.

**GEIKIE**, *ge' kie*, SIR ARCHIBALD (1835-1915), considered one of the greatest geological authorities of all time, was born in Edinburgh. Following his graduation at the University of Edinburgh, he became a member of the Geological Survey of Scotland, of which he was later made a director. After teaching geology and mineralogy in Edinburgh for eleven years, Geikie became director of the Museum of Practical Geology in London. He was elected president of the Geological Society of London, and also became president of the British Association for the Advancement of Science. In 1897 he visited America and delivered a series of lectures at Johns Hopkins University and at McGill University in Montreal. His textbooks have been used in both Europe and America.

**His Books.** Geikie began his long list of works in 1858 with *The Story of a Boulder; or Gleanings from the Note-Book of a Geologist*. Among his most important books are *A Textbook of Geology*, *Ancient Volcanoes of Britain*, and *The Foundations of Geology*.

**GEISSLER'S**, *gise' lürz*, TUBES, a name given to glass tubes used to show the brilliant effect produced by electricity when it is passed through a rarefied gas. They are named

after Heinrich Geissler (1814-1879), a celebrated German scientific instrument-maker, by whom they were first constructed. These



VARIOUS FORMS OF GEISSELER'S TUBES

tubes, made of very hard glass and of different shapes (as shown in the illustration), have a platinum wire sealed into each end, which serves as an electrode. The tubes are filled with various rarefied gases, such as hydrogen, oxygen, nitrogen, air, and so on. When the electrodes are connected to the opposite poles of an electric machine or to an induction coil, an electric current is passed through the tubes. The color of the light produced depends upon the shape of the tubes, the gas with which they are filled, and the degree of rarefaction of the gas, and by varying these conditions, very pleasing effects can be obtained. Geissler's tubes are also valuable in scientific research, such as examining various incandescent gases with the spectroscope.

H.S.E.

**Related Subjects.** The reader is referred in these volumes to the following articles:

|               |              |
|---------------|--------------|
| Cathode Rays  | Electrode    |
| Crookes Tubes | Röntgen Rays |
| Electricity   | Spectroscope |

**GELATIN**, *jel' a tin*, a transparent, brittle, yellowish substance obtained from the air bladders of fish and the bones, skin, and muscle of animals. When bones are made into gelatin, they are treated with hydrochloric acid; the mineral substances dissolve and leave only the cartilage. After this has been thoroughly boiled in water, it dissolves and forms a crude gelatin, suitable only for glue. To purify it, the gelatin is again soaked in hot water and filtered, while hot, in ninety per cent alcohol, a process which causes the impurities to settle at the bottom.

The best and purest gelatin is found in the air bladder of the sturgeon and, as it is easily

digested, it is used as a food for invalids. In cold water it increases to five or ten times its weight, becoming an elastic, jellylike mass, but in hot water it always dissolves; in the pure state, which is one kind of *isinglass*, it is used to make jellies, blanc-mange, and to thicken soup. Gelatin is a protein food, but lacks the three amino acids that make typical proteins valuable as tissue-builders. Therefore, though easily digested, gelatin preparations in themselves are not nutritious. This fact makes gelatin desserts acceptable to persons who wish to reduce (see OBESITY). Agar-agar, a Japanese preparation made from seaweed, is a laxative regarded as vegetable gelatin because it has the consistency of true gelatin.

The combination of tannin with gelatin in hides changes them to leather, and it is upon this principle that the art of tanning depends. In medicine, pure gelatin capsules are made to contain bitter doses, and one variety of coating on pills is the same substance. Bacteriologists use gelatin as a medium in which to grow bacteria that they desire to study.

The "sizing" which is used to stiffen silks, gauze, and linen, as well as that required in paper-making and in paints, is often gelatin; it is also an important ingredient of printers' rollers. In taking impressions and casts for making models of type, and in the manufacture of certain cements and courtplaster, gelatin is used. In combination with other substances, it forms the copying-pad in a variety of copying processes, such as the hectograph; it is the coating for glass plates or films used for dry-plate photography; and is an ingredient in the films for moving-picture machines.

E.V.M.C.

**GELÉE**, *zhé lē'*, CLAUDE (1600-1682), generally known as CLAUDE LORRAIN, from his having been born in Lorraine. He was a celebrated French landscape painter, whose pictures were noted for the brilliant effects of light reflected in the sky, clouds, and water, and for the poetic feeling shown in his interpretation of Nature. He made his studies in the open field, where frequently he remained from sunrise till sunset, watching the effects of the shifting lights upon the landscape. However, his figures were not up to the standard of his other work, and he usually engaged other artists to paint them in for him. He was wont to say that he sold his landscapes and gave away the figures.

After studying in Naples and Rome, Gelée traveled through Germany and France, and then settled in Rome for the rest of his life. In order to avoid a repetition of subjects, and also to detect the counterfeit copies of his works, he made tinted outline drawings of all the pictures which he sent outside of France.

**His Work.** Among his famous paintings are *Embarkation of Saint Ursula*, now in the National Gallery, London; *Finding of Moses*, in the Madrid Gallery; *Expulsion of Hagar and Ishmael*, in Munich; and the *Village Dance* and the *Landing of Cleopatra at Tarsus*, in the Louvre, Paris.

**GELSEMIUM**, *jel se' mi um*, OR **YELLOW JASMINE**, *jas' min*, a climbing shrub, native of the United States, whose rootstock and rootlets yield a powerful drug called gelsemium. This shrub, with its opposite, lancelike, shining leaves, and clusters of funnel-shaped, sweet-scented yellow flowers, grows near waters in rich clay soil from Virginia to Florida and Texas. There the odor of the flowers in the dampness of morning or evening is at times very noticeable.

Although the drug gelsemium is sometimes used in cases of malarial fever, rheumatism, and neuralgia, it is not often used, because of its dangerous qualities. A slight overdose will cause death. Drooping of the eyelids is the first symptom of too large a dose of the drug. Effects are counteracted by carbonate of ammonia, brandy, aromatic spirits of ammonia, or morphine, as prescribed by a physician.

B.M.D.

**Scientific Name.** The shrub belongs to the family *Loganiaceae*. Its botanical name is *Gelsemium sempervirens*. The flowers resemble those of the jasmine, whence the secondary name given above. See illustration under **JASMINE**.

**GEL, jel, STATE.** See **COLLOIDS**.

**GEMARA**, *gem ah' rah*. See **TALMUD**; **HEBREW LANGUAGE AND LITERATURE**.

**GEMINI**, *jem' i nye*, THE TWINS, in astronomy, the third sign of the zodiac, and also a constellation now in the sign of Cancer. This constellation contains the summer solstice, the most northerly point reached by the sun. The two brightest stars of the constellation are named for the twins Castor and Pollux, the sons of Jupiter and Leda. The symbol of Gemini is  F.B.L.

**Related Subjects.** For illustration of the constellation see the article **ASTRONOMY**. See, also, **SOLSTICE**; **ZODIAC**.

**GEM OF THE MOUNTAINS**, a popular name given to Idaho (which see).

**GEMS, OR PRECIOUS STONES.** In a general sense, these terms include all minerals and stones that are used for jewelry and other ornamental purposes, and which are characterized by beauty, rarity, or some other outstanding quality. The United States customs

regulations classify but four stones as *precious*—diamonds, rubies, sapphires, and emeralds. Others, such as the opal, turquoise, garnet, and amethyst, are defined as *semi-precious*. In this article, both precious and semi-precious stones are treated. It should be noted here that one beautiful gem, the pearl, is not a stone at all, but is derived from mollusks. Amber, another substance used as a gem, is a fossil resin, and coral, popular for necklaces, is a secretion of tiny sea animals.

The word *gem* comes from the Latin *gemma*, meaning *bud*. Modest brown or dull-green buds burst forth into lovely flowers of beautiful hues, under the action of warmth and moisture and sunshine. The story of precious stones is very similar. From ugly lumps or "buds" of mineral matter, after a process of cutting and polishing, beautiful crystals are obtained, which hold in their depths forever all the beautiful tints and hues which in flowers fade and die.

**The Romance of Gems.** Although there is no doubt that brilliant stones were at first gathered for their beauty, it is also true that from earliest times, gems have held definite meanings to people of all nations. Those who pretended to be learned about the stars (astrologers) believed that gems, as well as stars, influenced the lives of people, and from the first century it was believed that a special stone was dedicated to each month of the year. Even wise men and seers thought that the health and fortunes of individuals could be affected by the wearing of precious stones, and the stories of gems worn as charms are many. The study of carved and engraved gems and of precious stones set in strange designs by people of long ago brings to light many interesting beliefs and startling tales of deeds done for the mere possession of a single precious stone. Gems have also played an important part in religious superstitions, and frequent mention of precious stones is made in Scripture. The histories of kingdoms are woven about the jewels of royal families and of the nobility.

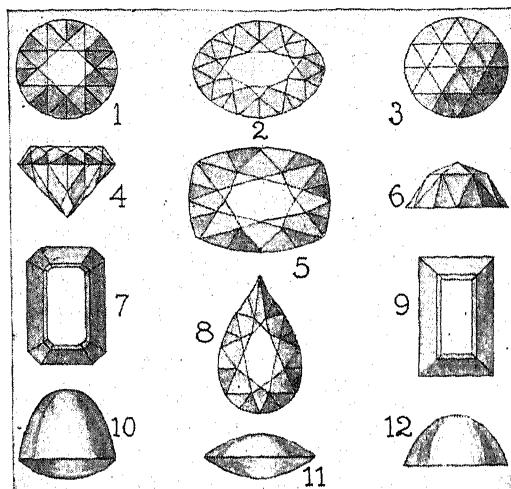
The art of engraving and carving gems held a high place among Greeks, Etruscans, Romans, and Egyptians, and in modern times Italy and Germany have been the chief seats of the precious-stone-engraving art. Stones which have a design raised above the general surface are called *cameos*; those with the designs sunk below the surface are called *intaglios*. Some of the earliest specimens of cut gems are seen in scarabs, or beetle-shaped seals. Valuable and interesting collections of ancient gems are to be seen in museums in many of the large cities of the world, and private collections are prized by students or lovers of gems everywhere. Yet only about 10,000 really antique gems are in existence. The Morgan collection,



GEMINI

exhibited in the American Museum of Natural History, New York, is one of the largest.

**Gems, Imitation and Artificial.** The fascination of gems has caused an ever-insistent demand for them. Their rarity and costliness,



PRINCIPAL FORMS

Above are illustrated the usual forms in which gems are cut. The names by which they are designated are as follows: (1) Round brilliant, top view; (2) Oval brilliant, top view; (3) Rose cut, top view; (4) Round brilliant, side view; (5) Cushion brilliant, top view; (6) Rose cut, side view; (7) Step cut, octagon; (8) Pear brilliant, top view; (9) Step cut, oblong; (10) High cabochon, side view; (11) Cabochon, side view; (12) Lentil-shaped, side view.

however, make their possession impossible to many. So the jeweler's art developed into the imitation of precious stones, and chemists attempted to produce gems artificially.

Imitation of precious stones has flourished since earliest times, and paste jewels, as they are called, have been so well made that they cannot be told from the real by an inexperienced person. It has become a common custom for women to have paste copies made of their valuable jewels, to be worn at places where attempts at robbery might be made. Guy de Maupassant's *The Necklace*, considered one of the greatest short stories ever written, is based on the loss of an imitation pearl necklace that was thought to be genuine.

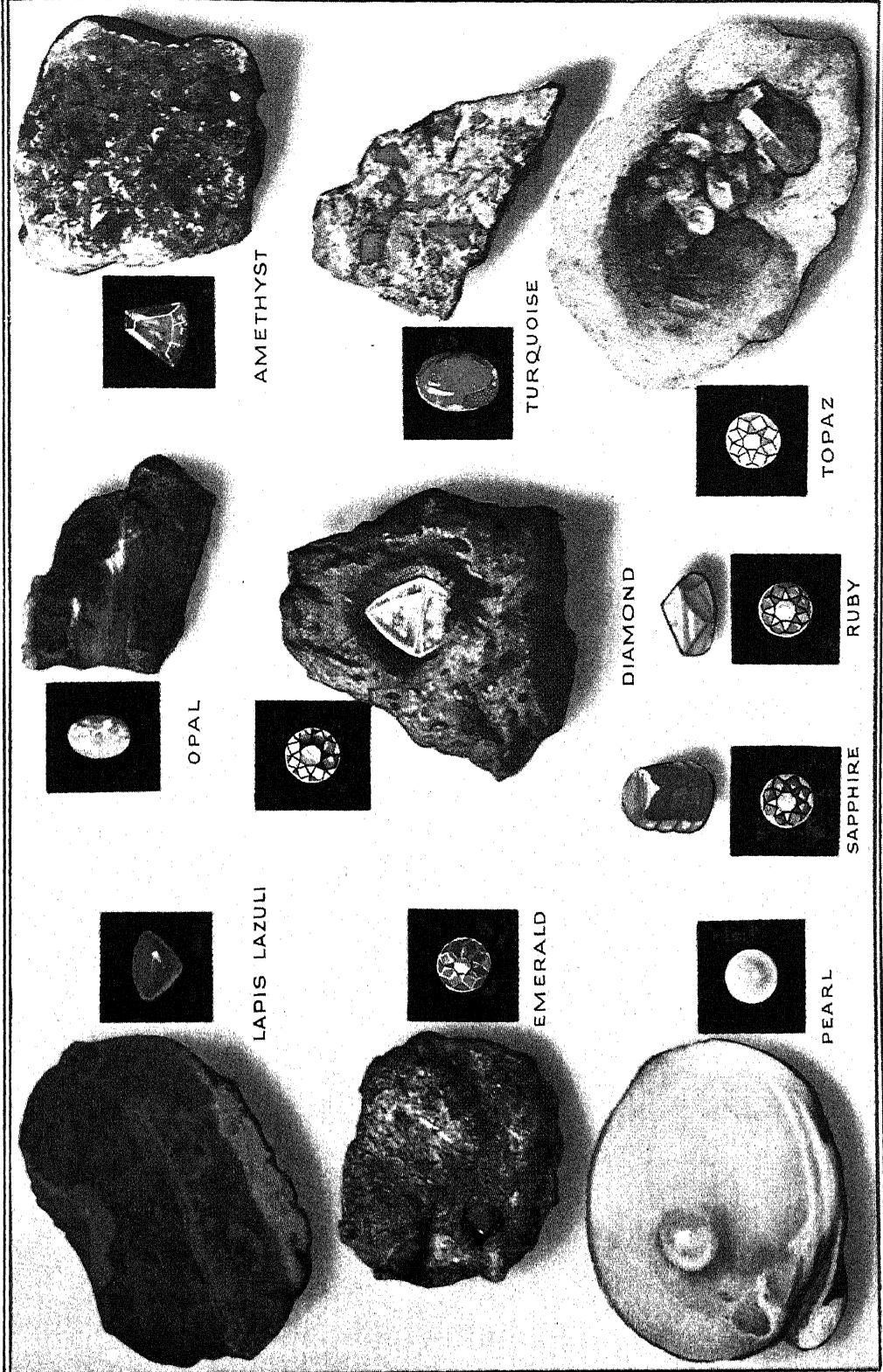
The Egyptians, who understood the art of coloring glass, made excellent imitations of the most costly precious stones known to them. Romans used powdered rock crystal in imitating gems. In the Middle Ages, excellent imitations of the emerald, ruby, sapphire, and topaz were produced. In modern times, the basis of most imitation gems is a variety of glass known as *paste* or *strass*. This glass, which is remarkably clear and brilliant, consists of pure powdered rock crystal, red lead, and dry potassium

carbonate. These ingredients are powdered carefully, mixed, and then subjected to heat for about thirty hours. The quality of the resulting glass depends largely on the regularity of the temperature and slowness of cooling. The glass is colored to imitate precious stones by the same process that is used in making colored glass. This paste, uncolored, resembles the diamond, but is soft and can be scratched easily. By testing with a quartz crystal or piece of hard steel, an imitation is easily detected.

Some imitation gems are merely cheaper stones which very closely resemble the genuine. Clear quartz, white Brazilian topaz, and colorless varieties of beryl, emerald, and sapphire are often sold for diamonds. Colored varieties of quartz are substituted for other gems. Another form of imitation of gems is known as *doublet*. Thin pieces of genuine gems are attached to valueless backings in such a way that the entire stone seems genuine. The imitation of pearls forms an important industry. Hollow glass beads are coated on the inside with a preparation made from certain fish scales. If colored pearls are desired, dyes are added to the mixture.

Numerous attempts have been made in recent years to produce genuine gems artificially—to solve by human skill one of Mother Nature's mysteries. Diamonds, rubies, emeralds, and other colored stones have been successfully made by the fusion of various substances by means of an electric furnace, and the industry has become an important one. At first the process was so expensive, and the stones produced were so small, that the experiment seemed impracticable for commercial purposes. The process was improved, however, and the manufacture of rubies, especially, was successfully accomplished in Paris. It is said that crystals weighing over forty carats and valued as high as \$25,000 each have been produced. The annual output of rubies in the Paris factory is 5,000,000 carats annually.

**Some Famous Gems.** Among the celebrated diamonds of the world, probably none has attracted more attention than the Kohinoor (which see), presented to Queen Victoria by the East India Company in 1850. The Cullinan, found near Pretoria in the Transvaal, weighed originally 3,024 $\frac{3}{4}$  carats, or 1.37 pounds, and measured 4 inches by 2.5 inches by 1.25 inches. It was said to be worth from two and one-half to five million dollars. After its discovery, it was cut into nine smaller stones. The Orloff, one of the most famous of the Russian crown jewels, was purchased in 1772 by the Empress Catharine II, who paid for it, according to the accepted story, \$450,000, an annuity of \$4,000, and a Russian title. There is a magnificent diamond in the Louvre, Paris, which weighs 1.36 carats and is valued at \$2,500,000. This stone,



SOME OF OUR FAMILIAR GEMS, AND THEIR APPEARANCE IN THEIR NATURAL STATE



called the Regent, is probably the finest of large brilliants.

One of the most beautiful pearls ever found is the Pelegrina, a pear-shaped stone weighing 134 grains, and described by an historian as being "as large as the largest pigeon's egg." It was presented to Philip II of Spain by a Spanish adventurer, and at the time was valued at 14,400 ducats (\$28,800). This pearl was found off the island of Santa Margarita, 100 miles from San Domingo. After remaining in the possession of Spanish royalty for many generations, it passed to a prominent Russian family.

T.B.J.

**Related Subjects.** The characteristics and sources of the various gems and gem materials treated in these volumes are given in the articles listed below. Several articles of supplementary interest are also listed.

|             |                     |
|-------------|---------------------|
| Agate       | Jade                |
| Almandine   | Jewelry (with list) |
| Amethyst    | Kyanite             |
| Aquamarine  | Labradorite         |
| Beryl       | Lapidary            |
| Birthstones | Lapis Lazuli        |
| Cameo       | Onyx                |
| Carbuncle   | Opal                |
| Carneelian  | Pearl               |
| Chalcedony  | Ruby                |
| Diamond     | Sapphire            |
| Emerald     | Sardonyx            |
| Garnet      | Topaz               |
| Heliotrope  | Tourmaline          |
| Intaglio    | Turquoise           |

**GENDARMES**, *zhon dahrmz'*. The strength of the French army for nearly 450 years before the Revolution was in a body of heavily armed cavalry, called *gendarmes*, which served as a bodyguard to the king. Each gendarme dressed in armor, and had five soldiers of inferior rank to wait on him. Since the Revolution, the name has been applied to military police who perform civil duties, much like members of state police in America. They are paid much higher wages than the rest of the army, from which they are picked because of their ability.

In civil life the name is given to members of the police forces in French cities.

**GENDER.** Just as living things are classed as male or female, and things without life as sexless, so in English grammar the words naming these things are said to belong respectively to the *masculine*, the *feminine*, or the *neuter gender*. *Neuter* and *gender* are derived from Latin words meaning *neither* and *kind*. Thus, gender may be defined as the property of a noun or a pronoun that indicates sex or absence of sex. It applies only to words, whereas sex applies to living things.

**The Simple and Logical Rule.** As suggested, gender in the English language is natural—that is, determined by the sex of the object for which the word stands. All nouns or pronouns denoting the male sex are masculine: *he, man, cock, boy, king*; all words denoting the female sex are feminine: *she, woman,*

*hen, girl, queen*; all words denoting objects without sex are neuter: *it, book, virtue, snow, knife*.

In most foreign languages, gender has nothing to do with sex; it is grammatical, not natural—that is, it is governed by the form of the word. The German word for *girl* (*Madchen*) is neuter in gender, because it happens to have a neuter ending; *woman* (*Weib*) is also neuter, so that the German, as Mark Twain laughingly remarks in *A Tramp Abroad*, says, "The fishwife has dropped *its* basket of fishes." In German *fork* is feminine and *spoon* masculine, while in French both are feminine. "English stands entirely alone," says the grammarian Ramsey, "in making gender a rational and intelligible distinction." As a matter of fact, the gender of an English noun acquires real importance only when the third personal pronoun follows, for this pronoun must agree in gender with the noun to which it refers; thus, *The Queen was saved by her guard, who lost his own life in defending hers*.

**Gender Forms.** No English noun has a distinctive neuter form, but there are some—relatively few in number—that distinguish the masculine and feminine in one of these ways:

(1) By different words for the masculine and feminine, which for convenience are usually learned in pairs; as, *husband, wife; son, daughter; bachelor, maid; monk, nun; wizard, witch; bull, cow; ram, ewe; gander, goose*.

(2) By adding the suffix *ess, ine, trix, or a* to the masculine to form the feminine. Of these endings, *ess* is the most common. This formation may or may not require some other change in the word; as, *actor, actress; duke, duchess; marquis, marchioness; prince, princess; hero, heroine; Paul, Pauline; czar, czarina; executor, executrix; sultan, sultana; signor, signora*.

(3) By joining a distinguishing word to a noun of indeterminate gender (see below); as, *billy-goat; nanny-goat; he-bear; she-bear; man-servant; maid-servant*. This method, once very common, is gradually going out of use. In the case of animals, the modern tendency is to prefix the adjective *male* or *female* where necessary to distinguish; in the case of human beings, to use the masculine form for both, letting the context indicate the gender.

**Common or Indeterminate Gender.** Most nouns denoting living beings may refer to either sex; for example, *visitor, servant, cousin, parent, child, friend, hearer, bird, butterfly*. Such words are sometimes said to be of the *common gender*—sometimes termed the *indeterminate gender*. If such a noun in the singular is used to refer to both sexes, it is proper to follow it by the masculine pronoun, which stands for both genders; as, *Every person has a right to HIS own opinion—not, to their own opinion, which is ungrammatical, or to his or her own opinion, which is cumbersome*.

**Special Cases.** The sex is often disregarded and the pronoun *it* is used in referring to a

very young child; as, *The baby dropped its ball; the child and its nurse were both ill.* Insects, small animals, and those animals with which man does not come in frequent contact are usually treated as neuter, while masculine or feminine gender is commonly assigned to the larger animals and those that mean most to man. Thus "he" is used for the dog, the cock, the horse, the elephant, the eagle; "she" for the cat and the hen; "it" for the ant, the fly, the squirrel, the rabbit. This is not, however, a hard-and-fast rule. When some inanimate object is spoken of as if it were alive, we have the figure of speech called *personification* (which see): things immense or sublime are treated as belonging to the male sex; those virtuous, lovely, or fertile as belonging to the female sex. Thus, Shelley writes:

How wonderful is Death!  
Death and his brother Sleep.

And Shakespeare pictures the dawn as a woman and the great sun as her lover:

See how the morning opes her golden gates,  
And takes her farewell of the glorious sun!

**The Changing Fashion.** At one time, distinctions of gender were considered so important in English grammar that forms like *teacheress*, *championess*, *neighboress*, and the like were in everyday use. Not many years ago, in fact, *instructress*, *songstress*, and similar feminine forms were considered good form. The present tendency is toward simplicity, and such gender terminations are being dropped as far as possible. To-day a woman writer is an *author*, a *poet*, or an *editor*, not the old-fashioned *authoress*, *poetess*, or *editoress*. See GRAMMAR.

**GENERA.** See BOTANY; ZOOLOGY.

**GENERAL**, an officer of highest military rank in all countries in which there is no provision in law for the grade of marshal or field marshal. There are four classifications in the army of the United States and in most European countries relating to generals:

**General**, the officer in supreme command of the military establishment, though in the United States he ranks below the civilian President of the country, who under the Constitution is commander in chief of the army and navy. The latter never intervenes, however, in the conduct of an army in the field. This officer, as the title indicates, exercises general command of the military forces.

Eight men in the history of the American army have held the rank of full general, namely:

|                    |                      |
|--------------------|----------------------|
| George Washington  | John Joseph Pershing |
| Ulysses S. Grant   | Tasker H. Bliss      |
| William T. Sherman | Peyton C. March      |
| Philip H. Sheridan | Charles P. Summerall |

**Lieutenant General**, the rank next below that of general. In the American army this grade has been authorized and later abolished as necessity has warranted. It was first held by Winfield Scott, and was then the highest army commission. The appropriate command for a lieutenant general is an army in the

field composed of two or more divisions; his only superior officer is the general. Fourteen men have held this rank:

|                    |                   |
|--------------------|-------------------|
| Winfield Scott     | Adna R. Chaffee   |
| Ulysses S. Grant   | Arthur McArthur   |
| William T. Sherman | John C. Bates     |
| Philip H. Sheridan | Henry C. Corbin   |
| John M. Schofield  | Hunter Liggett    |
| Nelson A. Miles    | Robert R. Bullard |
| Samuel B. M. Young | Edgar Jadwin      |

**Major General**, usually the highest army rank in the American army in times of peace. Only in national emergencies are the grades of general and lieutenant general revived, and nearly always these are abolished after the crisis has passed. In wartime the appropriate command of a major general is a division; in time of peace, a territorial department. From thirty to forty officers of this rank are constantly on active duty in the army of the United States.

**Brigadier General**, the lowest rank among general officers, whose appropriate command is a brigade, which consists of a designated number of regiments or battalions combined in one unit. Between fifty and sixty officers of this rank are always on duty in the American army.

**Related Subjects.** The reader is referred in these volumes to the following articles:

|                 |                                  |
|-----------------|----------------------------------|
| Army<br>Brigade | Marshal<br>Rank in Army and Navy |
|-----------------|----------------------------------|

**GENERAL EDUCATION BOARD**, an organization chartered by Congress in 1903 to promote education in the United States. The board was created to assist in the distribution of large benevolences for educational purposes, especially those contributed by Mr. John D. Rockefeller. Through this organization assistance is given to schools of all grades, from the common school to the university, without distinction of race, sex, or creed. It has been especially helpful in promoting education in the Southern states, though its activities extend to all parts of the country. The capital endowment amounts to about \$66,000,000. For further details, see EDUCATIONAL FOUNDATIONS.

**GENERAL FEDERATION OF WOMEN'S CLUBS.** See WOMEN'S CLUBS.

**GENERAL GRANT NATIONAL PARK.** See PARKS, NATIONAL; SEQUOIA.

**GENERAL GRANT TREE.** See PARKS, NATIONAL (General Grant National Park).

**GENERALIZATION**, the conclusion reached concerning the characteristics of a class of objects, by observing the qualities of several individuals of the class. A generalization is reached by inductive reasoning; that is, by observing particulars and drawing a general conclusion based upon these (see INDUCTIVE METHOD). For example, when similar traits are seen in many persons of the same nationality, the generalization is made that these characteristics belong to all people of that nationality. When it is observed that heat is transmitted more readily by iron, copper,

steel, and other metals, than by wood, glass, rubber, etc., the generalization or conclusion reached is that metals are the best conductors. The term *generalization* is applied to the act of drawing the conclusion, as well as to the result of the process.

C.E.S.

**GENERAL LAND OFFICE.** See LANDS, PUBLIC.

**GENERAL SHERMAN TREE.** See SEQUOIA.

**GENERAL STAFF**, the body of officers at an army headquarters constituting the executive department of the army. In the United States army, the General Staff Corps is a body composed of officers detailed from the army at large, headed by the Chief of Staff, with duties that include investigation of all questions affecting the efficiency of the army and its state of preparation for military operations. The general staff also renders professional aid to the Secretary of War and to general officers and other superior commanders. The details of officers to the General Staff Corps are for periods of four years, "unless sooner relieved." The Chief of Staff, under the direction of the President or the Secretary of War, has supervision of all troops of the line and of the several staff departments, and generally fulfills the duties formerly performed by the commanding general of the army.

**GENERATIONS, ALTERNATION OF.** See FERNS.

**GENERATOR.** See DYNAMO.

**GENES, jeeenz.** See EVOLUTION (The Factors of Evolution); HEREDITY.

**GENESEE RIVER**, a beautiful stream flowing through Pennsylvania and New York, whose name, which is of Indian origin, means *shining valley*. It rises in the northern part of Pennsylvania, and follows a northward course into New York, entering Lake Ontario seven miles north of Rochester, and about 140 miles from its source. Just before the river reaches the broad and fertile valley at Mount Morris, N. Y., it cuts its way through a deep, narrow gorge, whose perpendicular cliffs rise in some places 350 feet high; within this chasm it plunges over three cascades, one of which, Portage Falls, is 110 feet high. At the city of Rochester, where the river is crossed by the Erie Canal, it forms three waterfalls, which afford excellent water power. Lake vessels can navigate the Genesee for five miles of its course.

[See state maps accompanying the articles PENNSYLVANIA; NEW YORK.]

**GENESIS, jen' e sis**, the name applied to the first book of the Bible. In this book is told the story of the creation of the world and the formation of the chosen nation of God, the Israelites. After the appearance of sin in the world, and the subsequent separation of good from evil, the Flood was sent to punish the

wicked. Then the history of the world began again, with Noah and his family as the only survivors (see NOAH). Many years after, God called Abraham to become the father of the chosen people of Israel, and the wonderful growth of his nation is told in the remainder of the book. When the crops failed one year, and the people were suffering, Jacob, the grandson of Abraham, who had become leader of the nation, led all the people into Egypt, where his son Joseph had become the prime minister. At the close of the book, both Jacob and Joseph die, leaving the people still in Egypt. It is a wonderful account of the primitive growth of a nation, and the splendid story of Joseph is one of the most striking tales ever written. See JOSEPH; ABRAHAM.

**Derivation.** The word *Genesis* is from the Greek; it means *origination*, or *coming into being*, and was applied to the first book of the Bible in the earliest Greek translation.

**GENÈT, zhe neh'**, EDMOND CHARLES EDOUARD (1765-1834), popularly referred to in American history as "Citizen Genêt," was a French diplomat who created the first international crisis which confronted the young American republic. In 1792 he became minister to the United States, at the time of the French Revolution. He was enthusiastically received upon his arrival at Charleston, S. C., as a representative of a people striving for liberty; his reception was the heartier because Americans had not forgotten France's contribution to the success of the Revolutionary War.

The plain intent of his mission was to induce the new republic to declare war against Great Britain and ally itself with France, and to raise an army in America to wrest Louisiana from Spain and secure it again for France. Despite President Washington's proclamation of neutrality, Genêt endeavored to influence public opinion to side with France. He proceeded to arm and equip privateers and raise recruits in American ports, clearly leading the United States to violate its neutrality between France and England. This course, together with his many imprudent criticisms of the government, compelled Washington to demand his recall in 1794. Fearing the dangers of the Revolution, Genêt did not return to France, but settled in New York City, became a naturalized citizen, and married the daughter of Governor George Clinton.



Photo: Brown Bros.

EDMOND GENÈT

**Related Subjects.** The reader is referred in these volumes to FRENCH REVOLUTION and to WASHINGTON, GEORGE (Administrations).

**GENETICS**, *je net' iks*, that branch of biology which concerns itself with the laws of heredity and variation. The name is from the Greek for *to be born*. Genetics is applied in a practical way in the breeding of plants and animals. It has been proved by careful experimentation that outstanding characteristics are transmitted from parents to offspring in units, and that when the character of the parent cells is known, the characteristics of descendants may be determined through selective breeding. Thus the best specimens of plants and animals are used for breeding purposes, for these possess most definitely the distinctive qualities it is desired to perpetuate. The same principles apply in eugenics, the science of human improvement. R.H.

**Related Subjects.** The reader is referred in these volumes to the following articles.

|                 |           |
|-----------------|-----------|
| Breeding        | Eugenics  |
| Burbank, Luther | Evolution |
| Cell            | Heredity  |

**GENEVA.** See SWITZERLAND (The Cities).

**GENEVA, LAKE.** See SWITZERLAND (Famous Lakes; Physical Features).

**GENEVA, N. Y.** See NEW YORK (back of map).

**GENEVA ARBITRATION.** During the American War of Secession, a number of Confederate ships, notably the *Alabama*, did great damage to the commerce of the North by preying on its merchant vessels. As these Confederate ships had been fitted out in English ports and were permitted to sail therefrom, at the close of the war the United States government demanded that England pay damages for this violation of neutrality laws. On May 8, 1871, commissioners representing England and America signed the Treaty of Washington, which provided that the question of the claims against England should be decided by a board of arbitration, to meet at Geneva, Switzerland. The settlement of these claims is therefore known as the Geneva Arbitration. The tribunal, which consisted of distinguished statesmen from Switzerland, Italy, and Brazil, awarded the United States damages to the amount of \$15,500,000. See WASHINGTON, TREATY OF; ALABAMA, THE.

**GENEVA CONVENTION**, an agreement to better the condition of sick and wounded soldiers in time of war, entered into by nearly all of the nations of Europe at a conference held at Geneva, Switzerland, in 1864. The terms of the agreement, which have been accepted by every European government, by the United States, and by several South American and Asiatic countries, are as follows:

(1) Ambulances and military hospitals are regarded as neutral, as long as they contain sick or wounded persons.

(2) This neutrality is extended to the persons engaged in caring for the sick and wounded.

(3) The neutrality of these persons continues after the hospitals are taken by the enemy, and they must not be hindered from departing or remaining.

(4) If they depart, only their private property may be taken with them, except ambulances, which may be removed entire.

(5) A house containing a sick soldier is not to be used for the quartering of soldiers.

(6) Wounded men who are cured may return to their own country if they promise not to take up arms again during the rest of the war.

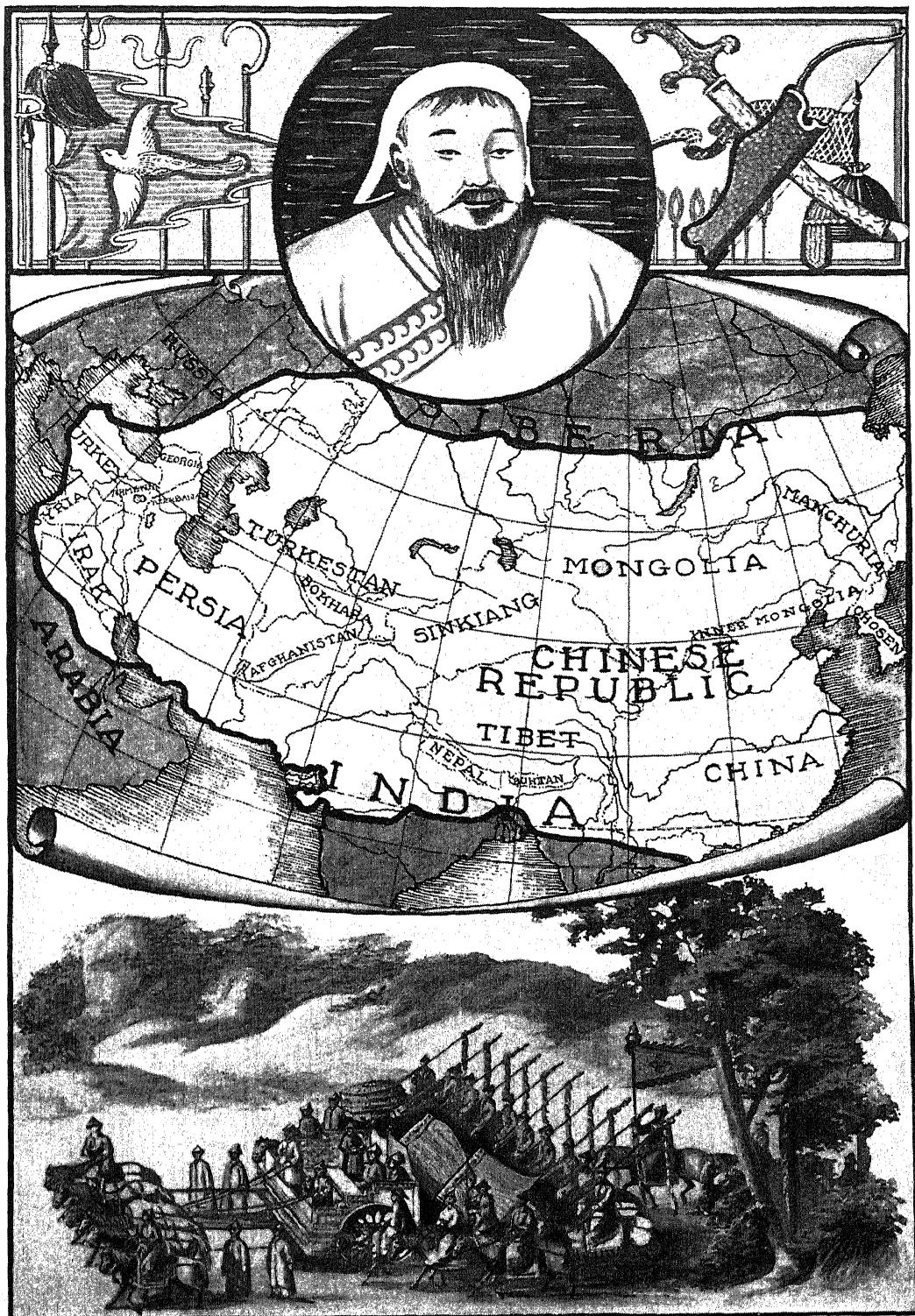
(7) Hospitals and ambulances must carry, in addition to the flag of the nation, a flag bearing a red cross on a white ground, and doctors and nurses must wear an arm badge of the same colors.

A second conference, held at Geneva in 1868, applied the principles of this agreement to war on the sea. It was then decided to declare neutral all hospital ships, merchant vessels having wounded on board, and boats picking up wounded or shipwrecked persons. These must carry the Red Cross flag, and their men must wear the arm badge. Government hospital ships must be painted white with a green stripe, and those of aid societies white with a red stripe. See RED CROSS SOCIETIES.

**GENGHIS KHAN**, *jen' giz kahn*, OR JENGHIS KHAN (1162-1227), began his career at the age of fourteen years as the chief of a small Mongol tribe, and soon displayed the marked military talent which made him one of the greatest conquerors in history. After much domestic warfare, he subdued various Tartar revolts, and was proclaimed ruler of the united Mongol and Tartar tribes. Claiming a divine call, he so inspired his soldiers that they willingly followed him to battle. The most important episode in his career was the conquest of Northern China. After a series of lengthy campaigns, Pekin, the capital, was taken in 1215. Turkestan was next invaded, and two of its cities, Bokhara and Samarkand, were demolished.

In 1225, although he was then over sixty years old, Genghis Khan attacked and conquered the king of Tangut (Southwestern China), who had harbored and refused to surrender two of his enemies. Worn with years and warfare, the Mongol conqueror then left further conquest to his sons, among whom, upon his death, his vast territorial possessions were divided. His grandson, Kublai Khan, founded the Mongol dynasty in China. See KUBLAI KHAN.

**GENII**, *je' ne i*, as most commonly understood, are those mysterious and fascinating spirits that are familiar to every reader of the *Arabian Nights*. Some were good, assisting Aladdin to build his palace, sympathizing with the needs of humanity, and bearing a lover half across the world in the twinkling of an eye that he might look upon his loved one's face; but



In the Time of Genghis Khan. The portrait shows a traditional likeness of the conqueror; at the left and right are his flag and implements of the period. Center, the territory in subjection, with present-day divisions. Below, type of war equipment of the period.

some were hopelessly evil, thwarting the powers of good in every possible way. A well-known example of this man-hating class is the one who threatened to kill his benefactor who had released him from the jar in which he was confined, and was prevented only by the ruse of his deliverer in pretending to believe that he could not again squeeze his gigantic frame into the small jar. Incensed, the genie crept into it, and was promptly sealed in. These genii, or as they are also called, *jinns*, play a very prominent part in the Mohammedan religion.

Really, the word *jinns* is the proper name for the *Arabian Nights* spirits, and the term *genii* was applied to them by the translators, who confused them in their minds with the genii (plural of *genius*) of the ancient Romans. To the Romans, the genii were protecting deities who presided over the destinies of men. Each person had his own special genius, who led him into life, accompanied him during its course, interfered powerfully in his affairs, and finally conducted him out of the world. See ALADDIN; ARABIAN NIGHTS.

**GENNESARET**, *jen es' a ret*, LAKE OF, the former official name for the Sea of Galilee, which is described in the article GALILEE.

**GENOA**, *jen' o ah*, popularly termed THE PROUD, and famed as the birthplace of Columbus, is the northern gateway to the heart of



LOCATION MAP

Italy and one of the greatest seaports on the Mediterranean Sea. It lies ninety-four miles south of Milan, in a delightful situation at the foot of the wide-circling Apennines. The slopes of the hills behind the city are covered with buildings, terraced gardens, and groves of oranges and pomegranate trees; while the summits of the loftier ranges are capped with a line of strong forts and batteries. Its fine harbors, which are equipped with modern

quays and docks, welcome ships from all parts of the world. The exports consist of cotton goods, fruits, wine, olive oil, silk goods, coral, paper, soap, macaroni, and marble.

Genoa is a city of palaces, splendid in architectural beauty. Whole streets of wonderful buildings invite the visitor to their great halls, where the medieval nobility once dreamed of greatness and of war, and of the wealth that picturesque caravels brought to them from the lands beyond the seas. To Columbus, Genoa's most famous son, there is a fine monument, sculptured by Canzio. Victor Emmanuel, first king of United Italy, and Mazzini, the Italian patriot, who was born in this city, are likewise honored by imposing monuments. The city is noted for many fine churches, and is well supplied with technical schools and institutions for higher education. It also has numerous philanthropic foundations, a fine library, and an Academy of Fine Arts. Its Campo Santo is the most pretentious cemetery in the world; its Carlo Felice Theater is one of the largest in Italy.

**History.** Genoa has a centuries-old record of maritime glory. It was famous as a seaport under the Romans. After the breaking up of the empire of Charlemagne, it constituted itself a republic, presided over by doges (see CRY STATES). From 1119 to 1284 it was almost constantly at war with Pisa, in which Genoa was finally victorious. The thirteenth century marks the beginning of a long series of wars with Venice for commercial supremacy in the East. In the meantime, civil dissensions exhausted and demoralized the state, and occasioned many changes in the primitive form of government. In 1528 the disordered state regained tranquillity, which continued to the end of the eighteenth century. The form of government established was a strict aristocracy. Little by little, Genoa lost all its foreign possessions. Corsica, the last of all, was ceded to France in 1768. In 1800, after the Battle of Marengo, the city was taken possession of by the French. Five years later it was formally annexed to the empire of France, and in 1815 to the kingdom of Sardinia, with which it became a portion of United Italy [see ITALY (Unification)]. Genoa is the capital of the province of Genoa. Ranking sixth among Italian cities, it has a population, with its suburbs, of about 333,300.

**GENOA, GULF OF**, the arm of the Mediterranean Sea on which the city of Genoa is situated. It is really tributary to the Ligurian Sea, as that part of the Mediterranean is called.

**GENOA CONFERENCE**, an international meeting of the powers of Europe in Genoa, Italy, in April and May, 1922. It was called for the purpose of bringing about the economic reconstruction of the continent and the restoration of normal conditions throughout the

world. This conference was the first in history to include representation from every country of Europe except Turkey. Twenty-seven independent states sent delegates, including Britain's overseas dominions and Japan. The United States, though invited, declined to participate.

Germany and Russia were the chief concern of the conference. The former was in financial difficulties growing out of war reparations; and the Soviet government of Russia was desirous of receiving recognition from the other powers.

Recognition of the Soviet Republic had been assured by the powers, provided there should be compliance with certain definite conditions. The conference outlined these conditions as follows:

- (1) Nations cannot repudiate their debts.
- (2) They cannot wage war against established conditions.
- (3) They shall not engage in aggressive operations against their neighbors.
- (4) The nationals of one country are entitled to impartial justice in the courts of another.

These points indicate some of the fundamental conditions of civilized intercourse which it had appeared the Soviet government had ignored. To the surprise of the conference, the Russian delegation accepted the principles of these demands, though they seemed contrary to communistic theories. Their acceptance indicates that modern nations are interdependent economically, and that none can stand alone.

In the midst of the work of the conference, Germany and Russia announced that they had entered into a new treaty nullifying the Brest-Litovsk Treaty of 1917, and providing for the resumption of full diplomatic relations and canceling all war claims against each other. This announcement caused a sensation, as it seemed calculated to embarrass the conference on some of the important questions before it. The delegates of these two countries were excluded from the debates which followed.

Premier Lloyd George of Great Britain proposed that for a period of ten years all the nations represented at the conference pledge themselves to abstain from aggression against their neighbors. It was his aim to reduce European armaments, lighten the heavy financial burdens of all peoples, remove distrust, and hasten the economic rehabilitation of the nations. He hoped, too, that the plan would be a forerunner of a permanent non-aggression pact.

This plan failed of acceptance, but an arrangement embodying these points was adopted with the provision that it should be effective for eight months.

The convention adjourned with the understanding that it should meet later at The

Hague, with a different roster of members, to discuss further the Russian demands for recognition and the subject of international loans.

**Related Subjects.** The reader is referred in these volumes to the following articles:

|               |                     |
|---------------|---------------------|
| France        | Lloyd George, David |
| Germany       | Peace Conference,   |
| Great Britain | International       |

Russia

**GENRE, *zhan' r'*.** See PAINTING.

**GENSERIC, *jen'sur ik* (395-477),** a powerful king of the Vandals, who conquered all Africa west of Carthage in A. D. 429, and finally seized the city, which he made capital of his new possessions. He then captured parts of Sicily, Sardinia, and Corsica; in 455 he marched against Rome at the invitation of Eudoxia, the widow of Valentinian, who was eager for revenge against Maximus, her husband's murderer. After two weeks of plunder, he left the city with his soldiers, carrying off Eudoxia and her two daughters. At the date of his death, he still was in possession of all his conquests. See VANDALS.

**GENSFLEISCH, JOHANN HEINE,** the real name of Gutenberg (which see).

**GENTIAN, *jen' shan*,** any one of a genus of flowering plants found in all continents except Africa. The species best known is the fringed gentian, which, through Bryant's poem *To the Fringed Gentian*, will live in the memory forever. It is also the flower which inspired Montgomery's *Gentianella* and Emily Dickinson's *The Fringed Gentian*. It appears in September and October, "when woods are bare and birds are flown," "an undisputed queen," growing from one to two feet high, dressed in long green leaves and fringed flowers of delicate misty blue. Unfortunately, the popularity of Bryant's poem has led to the indiscriminate picking of the fringed gentian, and this lovely wild flower is becoming all too rare.

The common *yellow gentian* is found in the Alps and the Pyrenees, often growing in locations 3,000 to 6,000 feet above the sea. The Alpine peasants gather the yellowish-brown bitter root of this species and sell it for flavoring bitters, and for use as a tonic and in diseases of the digestive organs. Large quantities of the root are imported into North America.

Other species of gentian found in America are the *downy gentian*, with stem rough and hairy; the *solitary gentian*, each slender stem bearing but one large bell-shaped, light-blue flower; and the *closed*, or *bottle*, *gentian*, in which the flowers never open. (See page 2720.) B.M.D.

**Scientific Names.** The gentians belong to the family *Gentianaceae*. The fringed gentian is *Gentiana crinita*; the yellow gentian, *G. lutea*.

**GENTILES, *jen' tylz*,** in ancient times, referred to the people of all nations other than the Jews, who, as the chosen people of God, considered themselves set apart for a special

mission in the world. Their religion with all its truths was given to the Jews that they might be a light to the Gentiles; but, through the strict laws enacted to prevent them from becoming corrupted by association with idolat-

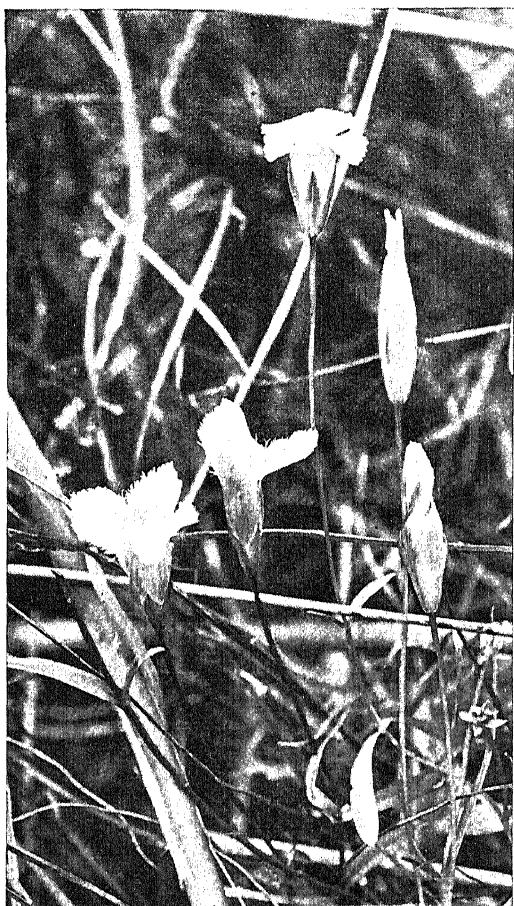


Photo: Visual Education Service

Thou blossom! bright with autumn dew,  
And colour'd with the heaven's own blue,  
That openest when the quiet light  
Succeeds the keen and frosty night.

—BRYANT: *To the Fringed Gentian.*

ters, they soon felt contempt for the latter. Even the Christian Jews were offended when Peter, taught by the vision at Joppa, went to visit and eat with Cornelius, who was one of the hated race (*Acts x, 28; xi, 3*). However, the early Church consisted largely of Gentiles, who seemed more willing than the Jews to adopt Christianity. To-day, the word has another meaning, for the Mormons consider all persons not of their faith, including Jews, to be Gentiles. See JEWS.

C.W.

"GENTLEMEN'S AGREEMENT." See CALIFORNIA (History: Oriental Immigration).

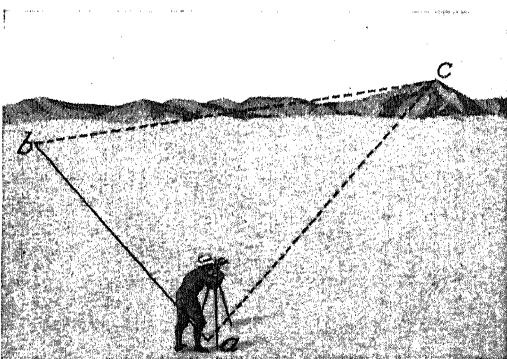
**GENUS, je' nus.** This word, which means kind, is used in the biological sciences to indi-

cate one step in classification. Animals or plants which have many characteristics in common, but do not resemble each other closely enough to be grouped as a species, may constitute a genus. The subject is more fully explained in the articles CLASSIFICATION; ZOOLOGY (Divisions of the Animal World).

R.H.

**GEODESY, je od' e sie,** the science which treats of the shape, size, and curvature of the earth. Geodesy is really a branch of surveying by which great distances are measured and points on the earth's surface are located. Whenever a survey extends over a large area, a method known as *triangulation* is employed. This is based upon the principle in trigonometry that if one side and two angles of a triangle are known, the other sides and angle can be computed.

Suppose scientists wished to determine the exact position of a distant mountain peak. They would first measure a base line (see *ab* in the illustration) on the most level tract of land in their locality, making it from five to ten miles long, and measuring it several times to make sure that the distance was exact. Then they would set their surveying instrument (a theodolite) at *a* and point it to *c*, recording the angle which the line from *a* to the summit made with *ab*. They would then take their instrument to *b* and measure in the same manner. From the length of *ab* and the angles at *a* and *b* they can readily find the length of the lines



Explanation in text.

*ac* and *bc*. Again, with *ac* or *bc* used for a base line, other points at various distances can be determined in like manner. The Coast and Geodetic Survey of the United States is constantly perfecting the survey of the United States, and other countries have corresponding organizations engaged in similar work. These have formed the International Geodetic Survey. See COAST AND GEODETIC SURVEY.

**GEODETIC, je o det' ik, SURVEY.** See COAST AND GEODETIC SURVEY.

**GEOFFREY, COUNT OF ANJOU.** See PLANTAGENET.

**GEOFFREY, jef' rie, OF MONMOUTH** (about 1100-about 1154), a Welsh historian, born at Monmouth. Little is known of his early life. He is supposed to have been a Benedictine monk, and later bishop of Saint Asaph. The most important of his works is the *Historia Regum Britanniae* (History of the Kings of Britain); the work is said to be chiefly a translation of ancient Breton manuscripts, and gives what claims to be a history of the British

kings from Brutus, the Trojan, down to 688. While it is of the greatest interest as the main foundation of the legends of *King Arthur and the Knights of the Round Table*, *Lear*, and others, it is considered of little historic importance, though one of the sources of the Arthurian legends.

Geoffrey also wrote a Latin translation of Merlin's prophecies (see MERLIN), written down to the time of Geoffrey.



**GEOGRAPHY** is one of the most interesting of all the sciences, not only because it has so many phases, but because it touches human life at so many points. In fact, it may be called one of the few universal subjects. A man may live all his life without studying even such common subjects as spelling and grammar, for instance, but he cannot grow up without constant contact with geography. The tiny baby just learning to walk is accumulating geographic knowledge—learning which chairs are so far apart that an unaided journey between them is impossible; which tables are so placed that they offer aid to a little voyager who has set out on too long a journey. The older child learns more—where the corner candy-store is; where the fascinating ditch flows, down which toy fleets may be sailed; which side of the house has the pleasantest breeze on a hot summer afternoon. To be sure, the child does not think of all this as geography—he is simply fitting himself to his surroundings; but it is a type of the formal geography which he will study in school when he gets older.

**What Geography Is.** Writings about the earth—that is what geography really is; for *geo* comes from a Greek word meaning *earth*, and *graphy*, from the word *to write*. It takes but little account of what the earth was in the past, save as bygone conditions influence world facts to-day; it pays no attention to the manner in which life, whether plant or animal, came to be on the earth; it does not directly concern itself with the stars and the planets; yet it is closely related to geology, to biology, and to astronomy, the sciences which make the topics mentioned above their special field, and to other sciences as well. It treats of the form of the earth, the distribution of water and land, the height of mountains and

the depth of seas, the distribution of plants and animals, the qualities which fit or unfit a region to be the home of man, and the reasons, so far as may be known, why things are as they are on the earth's surface. The history of Greece, for instance, does not naturally seem to be a part of geography; but when it is understood that the history of Greece resulted largely from the geography of the little country; that a number of little independent states grew up, rather than one large state, because of the mountain barriers, then it may be seen how very closely the history and geography of some countries are connected. Indeed, one cannot fully understand the history of any country without a knowledge of its geography, for not only the economic development and the relation to other nations, but the national characteristics of the people, are influenced profoundly by conditions of soil, topography, and climate.

It may thus be seen that geography is a very wide subject, with phases which are certain to delight any student. One student feels the romance of maps, those apparently simple charts which make so plain to him all that has been learned about the earth through centuries of study and exploration; another reads with delight of foreign lands where customs and character are different from those of his own land; a third likes the economic phases—the study of the great industries which have grown up in different parts of the world because of varying geographic conditions; while a fourth finds especially interesting the story of the changes which wind and rain, cold and heat, have worked in the surface of the earth upon which he lives. Geography tells its great stories to everybody.

**What the Ancients Thought of the World.** Very wise were some of the ancient peoples

on certain matters—so wise that in such subjects as art, literature, and philosophy little advance has been made since their day; but in geographic knowledge they were woefully lacking. The small schoolboy of to-day, even the one who dislikes geography and thinks that the less he can learn of it the better, knows more about the subject than did Socrates or Plato, two of the wisest men the world has ever known.

In the first place, the ancient peoples believed, as do all primitive peoples to-day, that the earth was flat; that about it in all directions flowed a great sea, which was limited only by the canopy of the sky, bending downward to meet it. Each nation thought that its own territory lay just in the center of the earth, and many of them had legendary tales of islands which were situated far toward the sunrise or the sunset in the uncharted seas. The seafaring Phoenicians were not content with such legendary knowledge, and pushed out into regions unknown before, bringing back to the Asiatic world real information

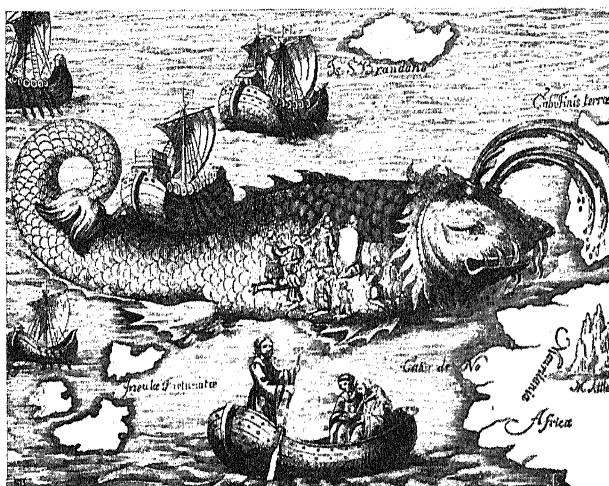
about lands far to the westward (see PHOENICIA). Some authorities even declare that, in the seventh century B.C., Phoenician navigators sailed around Africa.

The Greeks, with their young, inquiring minds—that marvelous people to whom the earth was all a wonder-world—were intensely interested in geography, and some of their wise men made very important contributions to the subject. It is a great mistake, for instance, to imagine that it was not until the days of Columbus that people knew that the earth is round, for before the time of Aristotle that fact had been conclusively established, and Aristotle himself figured the circumference of the earth at 40,000 miles. About 200 B.C., a Greek of Alexandria, Eratosthenes by name, made a far more accurate estimate, figuring out by means of measurements of the length of shadows thrown by the sun in different places that the earth was 25,000 miles around. Another Alexandrian, Ptolemy (which

see), was an epoch-maker in the science of geography, discovering many principles which further study has in the main proved correct, and drawing a map of the known world which remained the standard authority for more than ten centuries.

**The Age of Discovery.** The people of the Middle Ages paid little attention to geography. The subject was too practical, too material, for this age, in which churchmen were the only scholars and the affairs of the Church the only subject in which they were interested. Incredible as it seems, the knowledge that the earth was a sphere was lost altogether,

and the theory was developed that the earth was a flat surface, with Jerusalem as its exact center. A map of those old days is particularly fascinating. About Jerusalem as a center were spread out the known countries of the world—Persia, India, Arabia, Asia Minor, Greece, Italy, Africa; and even, far to the northwest, Great Britain. Mountains and rivers were rudely drawn; the Indian Ocean and the Mediterranean Sea wound their way between the



EARLY SUPERSTITIOUS NOTIONS

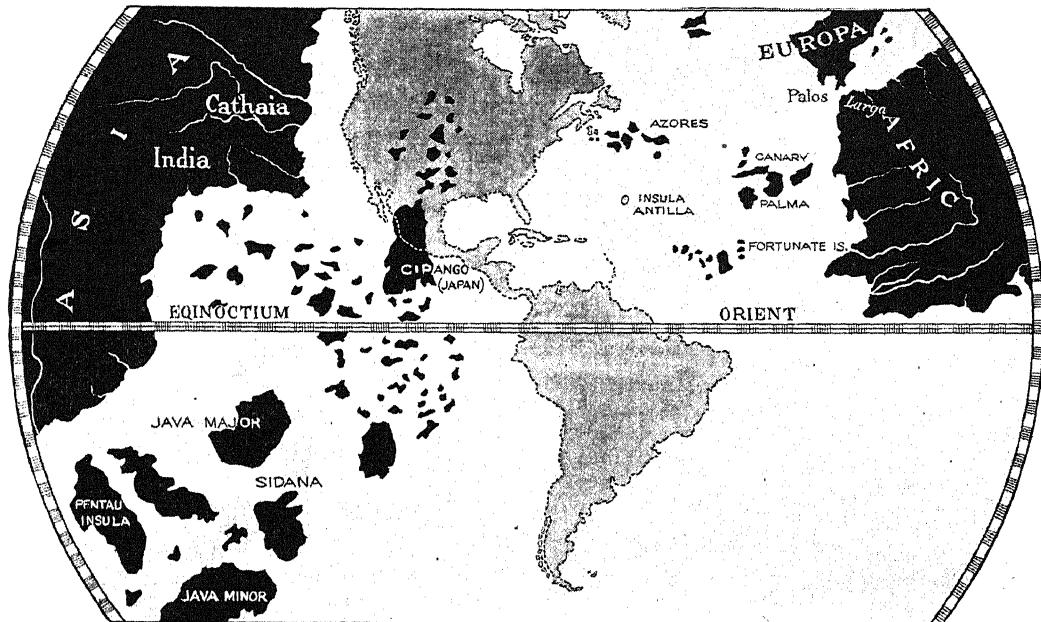
An ancient engraving illustrating a folk tale, showing how religious explorers landed on what they believed to be an island, to engage in religious exercises. After observance of their rites, the supposed island submerged, for it proved to be an accommodating whale.

shores, and all about the border were drawn the figures of the winds, each blowing with all his might, with distended cheeks. Shem, Ham, and Japhet ornament three of the corners, and all down one side there are drawings of fabulous beings—six-handed men, centaurs, mermaids, and men with necks like snakes. That map was made just about the time that Columbus started on his voyage, (or when he was preparing for it), which ushered in the modern age for the world.

Fortunately, however, Columbus did not look to such a map for guidance, but to the one made by Toscanelli according to Ptolemy's figures. There were mistakes in it, for its compiler had used the 40,000-mile estimate in making it; this misled Columbus, for the result of errors in the map put the west coast of Europe and Africa within 9,000 miles of the east coast of Asia; but this was a help rather than a hindrance to Columbus, for it made him think that the Indies, which he hoped to reach

by sailing westward, were closer than they really were, and so gave him courage to set out. It is unnecessary to give in detail all the results of that great era of exploration which began in the latter part of the fifteenth century. It is enough to say that the western hemisphere was discovered—the *New World*, as people called it in those days; that an all-water route around the south of Africa to India was discovered; and that the world was circumnavigated—the crowning achievement. Once the continents were actually known, exploration of their interiors was begun, and the

maps, there is the heroism of many men who risked and, all too frequently, lost their lives that the world might be made an open book to all who choose to read. Boys and girls who went to school in the middle of the nineteenth century, for instance, had in their geographies no such map of Africa as the textbooks of to-day show. The outline was there, but everything but the coastal region was left vague; it was called the "dark continent." Where were the sources of the great rivers that ran to the sea? What sort of peoples lived on their banks? Were there forests and moun-



BEHAIM'S MAP OF THE WORLD

Prepared about the year 1490. The American continents were not known to exist, and it was believed the way was open straight across the trackless sea to the continent of Asia. The dotted outlines of the two Americas were not a part of this map; they have been put there by our artist to indicate the land barrier between Europe-Africa and the Asiatic mainland, of which people of Behaim's day knew nothing.

outline of the American continent was put on the map of the world.

**The Age of Exploration.** There came a lull, when nations seemed to think more of acquiring territory and power than of acquiring knowledge; and not until the late eighteenth century did intense, driving curiosity waken again. As the late fifteenth and the sixteenth centuries constituted the age of discovery, so did the nineteenth century constitute the age of exploration. Not only in America, but in the more dangerous wilds of Africa, of Australia, and of Asia, this exploration went on, and there cannot be a correct appreciation of geography and of all that it tells without some knowledge of how this has been gained. A "dry study," children sometimes call it, and yet, back of its facts and its accurately drawn

tains, or flat prairies, in the interior? What animals roamed these wilds? Nobody knew; but to-day all this information in definite form is the property of every schoolboy, because there was no lack of men who felt the romance of geography.

There were some discoveries, too, left for the nineteenth and the twentieth centuries—discoveries in the far regions about the poles. How explorers met the challenge of these ice-bound lands and seas may be learned from the article on POLAR EXPLORATION.

**The Change in Geography.** It might seem that, when the discoveries were made and charted on the maps, when the descriptions were written and the statistics were gathered, the work of the geographer was done; but this is not true. The gathering of such facts, ap-

parently unrelated for the most part, was the main province of geography for centuries, but the new geography concerns itself rather with organizing these facts in accordance with certain governing principles—in other words, the new geography is a *science*, in the true sense of the word. The gathering of a multitude of facts has shown that there are undoubtedly fundamental laws upon which similarities and variations rest, and the geographer exerts himself to find out these laws and to explain them to the world.

It cannot be mere chance, for instance, that all the world's greatest and most progressive nations have grown up in the temperate zone. Are the conditions which have resulted in

this unchangeable? Is it hopeless ever to attempt to build up a civilization of the modern type in tropic lands, where lavish Nature seems able to produce everything except energy, or to populate regions of excessive cold? Can men go on for generation after generation, adapting themselves to geographic surroundings, and the surroundings to themselves, without in time acquiring the characteristics of the original inhabitants of the region? Many and interesting are the problems related to human life which the geographer is called upon to solve, and it is the scientific point of view from which such questions are studied that distinguishes the new geography from the older conceptions of the science.

R.H.W.

### Divisions of Geography

So wide a subject as geography must of necessity be broken up into various divisions, and the most commonly accepted classification divides it into *mathematical geography*, *physical geography*, and *biogeography*. This last-named division, of which the name at first appears somewhat difficult, is merely "life geography," the most important part of which is *human geography*; this includes *political* and *economic geography*.

**Mathematical Geography.** In a way, this lies at the basis of all the other phases of the subject. It treats of the shape of the earth, of its size, and its movements. At first thought, it might seem that this is a very abstract division of geography, having nothing much to do with the life of man on the earth; but what has a greater influence on man and his activities than the changing seasons, and do not these depend entirely on the movements of the earth among the planets? Mathematical geography is closely related to astronomy, for only by astronomical means can vast measurements be made or such complicated movements calculated. Only the simpler elements of mathematical geography are necessary to the ordinary student of the subject—only such as will give him an appreciation of distances on the earth's surface, of latitude and longitude, of the inclination of the earth, which determines the various zones, and of the relation of time to longitude.

**The Useful Map.** One of the very important branches of mathematical geography is map-making, or, as it is more technically called, *cartography*. What is a map? It is not a picture, for the lines upon a map do not resemble very closely the objects which they represent. Time was, in the old days of map-making, when attempts were made actually to picture conditions. Rows of little hills, as accurately drawn as might be, showed where the mountains ran; a group of buildings represented a city; trees were sketched to show

forest land, and even animals were shown in the wild regions. But to-day, the map-maker does not need artistic skill of just this sort, for there has been an agreement as to certain symbols which shall represent certain facts. A map, then, is a *representation*, and not a picture, and it may show the entire surface of the earth or any part of it.

A child, asked as to what a map can show him, finds no difficulty in his reply. It shows the difference between land and sea, distinguishes one country from another, shows rivers, mountains, lakes, cities, which city is the capital of a country, and, sometimes, the relative size of cities. These are, indeed, the main things which the commonest type of map shows, but more and more, there are coming into use maps which show other things. Particularly well known are the maps which show by shading the varying elevations above sea level; relief maps, they are called. Then there are those which show railroads and roads, those which show mineral productions, vegetable or animal life, or industries. Even the regions in which the various religions prevail are shown on maps. In fact, there are few great facts about the world and its inhabitants which cannot be shown more strikingly by means of maps than in any other way. No one who has ever studied maps carefully can fail to realize their appeal. There is the delight of finding the familiar home city, of tracing the course of the river which is but a little trout stream as it flows by the home farm, but swells later to a mighty river, of seeing in graphic form the relative elevation of the everyday surroundings; and then there is the equally great pleasure of picking out the far-away cities whose names have always had a particular charm, of marking the course of the rivers whose names have been sounded for centuries in literature, of finding the part of the world in which great events are taking place to-day. Who, on taking a journey across

the North American continent, has not felt the need of a map, that he might know when he passed from one state or province to another, what river it was that ran beside the train for hours, or where the lines ran that marked the change from one system of time to another?

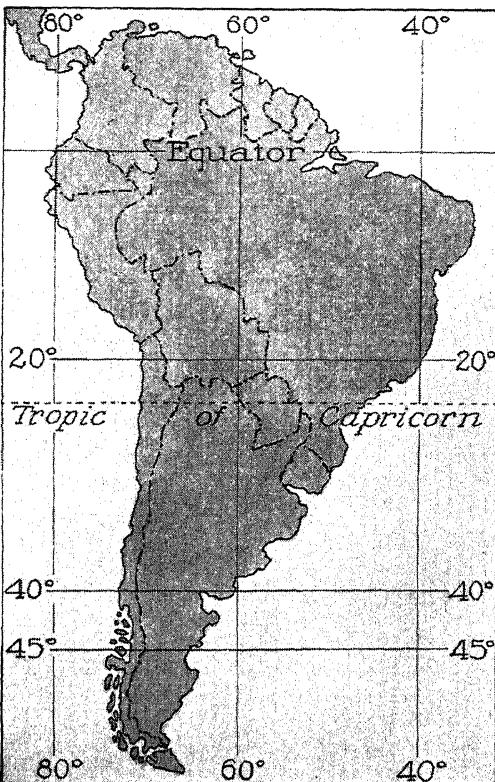
These things make up the romance of maps, but there is a very practical and laborious side to them. The child who draws in school a map of Illinois or of Alberta, who carefully sketches the continents, beginning with Africa or South America and coming by degrees to the intricacies of the European or North American coast line, thinks that he has "made a map"; but it is one thing thus to draw with the eyes on something which has been already perfected, and an entirely different thing to work out a satisfactory method of plotting such maps in the first place.

For the earth is round and most maps are flat; therein lies the great difficulty. Slit the skin of an orange straight around, letting the cut pass through the ends or "poles," and remove it in two parts. These two hollow hemispheres may well represent the two hemispheres of the earth, or rather, their surface. Can these be flattened out on the table without further cutting? Obviously not; and it is just as impossible to represent the surface of the earth accurately on a flat surface. With a sharp knife cut down from the "poles" toward the center, or "equator," of the orange skin, taking care not to sever the hemisphere entirely. When a number of slits have been made, the skin may be laid approximately flat on the table, but while the "equator" remains just as it was at first, toward the "poles" there has been considerable spreading.

Now, suppose there had been drawn on this orange skin, as on a little globe, a map—perhaps the map of North and South America. What would be the result, as regarded the northern part of North America, the widest land area? The western point of Alaska and the eastern point of Labrador would be much farther apart than they were on the original orange skin, and there would be many "gaps" in the map. In making maps, compromises are necessary in meeting this difficulty, and no flat map can ever represent accurately any very large part of the earth's surface. On an ordinary map of the world, for instance, where the degrees of longitude are shown as just as wide at the pole as at the equator, the land masses are all "top-heavy" toward the poles, appearing far wider there than they really are.

The subject of *projections*, or the devices resorted to with the object of lessening these errors, is too technical for such an article as this. Best known is *Mercator's projection*, which is useful for sailors' charts, but which by no means avoids the difficulties of map-distortion.

*Map-Making in School.* Such map-making as is referred to above—the free-hand sketching of continents, countries, states, or provinces—is useful, because it impresses upon a child's mind outlines and, if carefully done, comparative areas; and the value of such an exercise may be increased by the addition of rivers,



EXAMPLE OF MERCATOR'S PROJECTION

mountains, and cities. But this is by no means the most valuable sort of map-making for a child. He can obtain a far better idea of the principles of map-construction by charting his familiar environments. The earliest attempts should be simple—perhaps he may map out the schoolroom, with straight lines to represent the rows of desks, a square for the teacher's table, and a circle for the heater. But his map should be drawn to scale; that is, measurements should be made, and a scale of drawing decided upon. If the room is thirty feet by twenty feet, and the map is to be drawn upon a scale of five feet to one inch, the map will be six inches by four inches. Later, the child may draw a map of the school yard or of his own yard, or perhaps even of the block in which he lives, but unless the idea of scale is kept in mind, no real gain is made. Of course, such maps of limited areas do not give the pupil any idea of the difficulty of charting

the "great round world," but they do show him many other things, such as the need for accuracy in measuring and the importance of scale.

**Physical Geography.** This second great division of geography, very commonly known as *physiography*, may ignore living things, and treat of the earth's appearance and the changes which have been wrought and are being wrought to-day in its surface. The three "spheres" of the earth's surface which it considers are the land, the sea, and the air, and it may be seen at once that these offer a basis for a very wide science. Were the continents always where they stand to-day? Is "as old as the hills" a just expression, or are there young hills? Why are some mountains smooth and rounded, and some rough and craggy? Why are some rivers broad and sluggish, and others narrow, dashing torrents? How deep is the sea? What makes the tides? Why does it hail in hot weather, but never snow? What determines the direction of wind? All these and a thousand other questions, many of them so interesting that if a man has once put them to himself, he cannot be content until they are answered, physical geography will explain. Though it does not deal with living things, it is a very "human" science, nevertheless, for it treats of the conditions under which living things exist.

**Biogeography.** It is life, whether plant, animal, or human, which is most interesting, and this last phase of geography is one of the broadest and most fascinating. To understand it thoroughly, one must have a knowledge of mathematical and physical geography, for this "life geography" is mainly a study of the manner in which the form, motions, climate, and the surface features of the earth affect living things.

**Plant Geography.** Anyone who has traveled to any extent has had his attention attracted by the variations in the forms of plant life in different localities. In Canada there are vast forests of cone-bearers—pines, firs, spruces, and hemlock; in the Eastern United States there are woods of beech and chestnut and oak; in Florida there are gloomy, mysterious but beautiful swamps; while the western part of the continent has here and there great stretches where sage, cactus, yucca, and similar plants grow. Sometimes one finds sharp contrasts. Thus, in the American continent, a high mountain range separates dreary deserts on the one side from fertile and productive lands on the other. In the tropical rain belt, pour down the rains that make Central Africa an almost impenetrable jungle, flanked on both sides by inhospitable deserts. Now the geographer does not content himself with saying, "There are deserts where there is no water, and rich plant growths where rainfall is abundant"; he goes

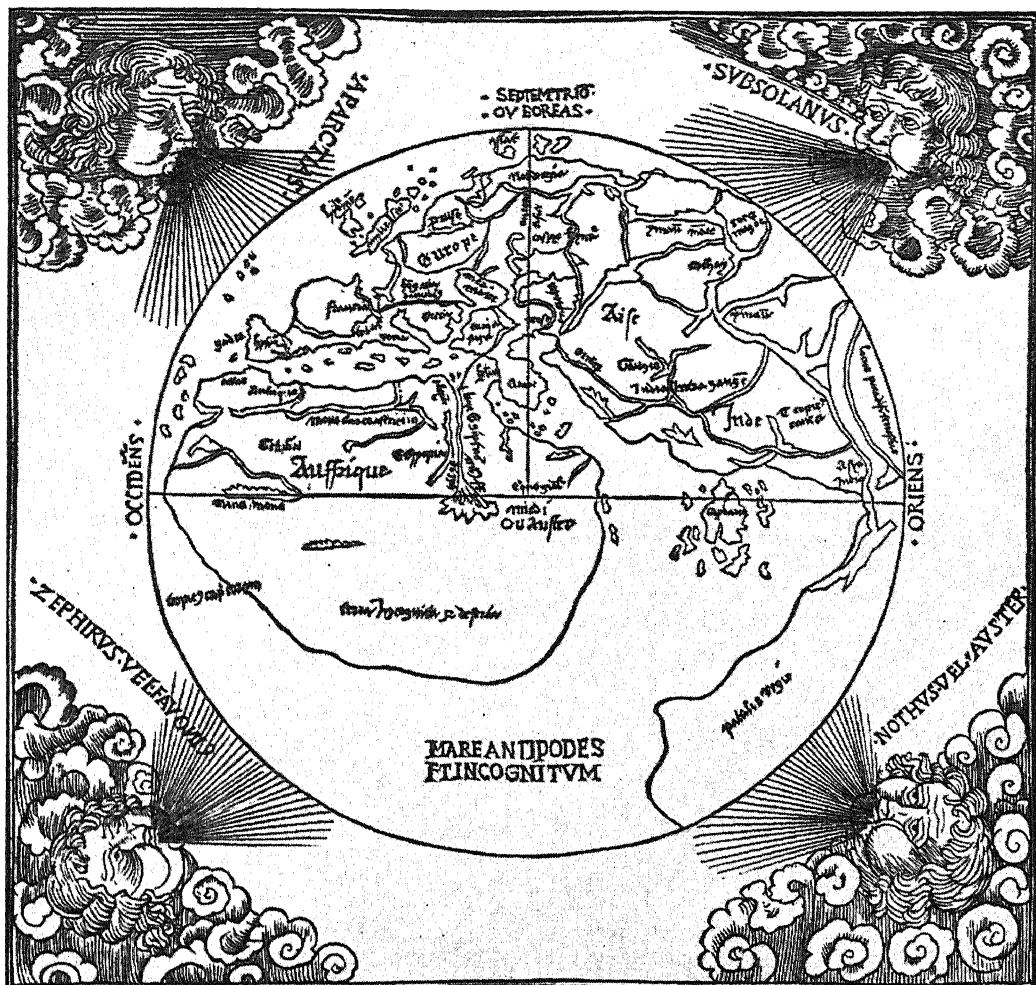
back of that, and works out the causes which govern the scanty or the plentiful rainfall.

Nor is it climate alone with which he concerns himself. It is not merely because of temperature and rainfall that the Canadian Northwest is a wonderful wheat-growing country; that Iowa produces great quantities of corn; that Florida grows grapefruit; and that Italy is famous for its grapes. The soil plays a large part in determining all these crops, and the geographer must pay attention to soils as well. When it is considered that, directly or indirectly, every form of animal life on the globe, including man, is dependent upon plants for its very life, the importance of such study of plant geography is evident (see PLANT).

**Animal Geography.** Animals are not so completely dependent upon conditions of temperature and moisture as are plants. If surroundings become too unpleasant and unfavorable, they can migrate, and, within reason, adapt themselves to a different environment. Nevertheless, there are distinct climatic zones of animal life as well as of plant life, and the animals of the Arctic regions differ as decidedly from those of the tropics as do the plants of the two sections. One may go to a zoological garden and see polar bears, lions, monkeys, Arctic foxes, and elephants in adjoining cages, but they are not thus closely associated in their natural homes. Time was when many of the animal forms were far more widely distributed than they are at present, but changing climatic conditions led to repeated migrations and to the existing distributions. Here again, however, as with the plants, it is not climate alone which has been the determining influence. South America and Africa, for instance, are both equatorial continents, but they are so widely separated that the animals of one continent apparently have never been able to migrate from the one to the other, at least in recent times. Nevertheless, there seems to be a very marked similarity between many species common to both. The monkeys, lizard species (alligators and crocodiles), antelopes, and animals of the cat kind (leopards and jaguars) do not differ very materially. The ostrich of Africa is represented by the rhea in South America; and the species from which have descended the animals of the llama kind in South America are thought to be progenitors of the species from which the camel is descended. Such similarities are observed also in North America and Europe, which have many species, both of animal life and plant life, in common.

[One of the most interesting phases of animal geography is the subject of migrations, whether of birds or of animals. See BIRD (Migration of Birds); ANIMAL (Migration of Animals).]

**Human Geography.** In a sense, all the other branches of geography may be considered as



OLD MAP OF THE WORLD

Made in Paris, in 1522.

leading up to the study of man and his environment, which is so important and has so many divisions that it practically constitutes a science in itself. *Anthropogeography* it is called, but that apparently difficult word simply means the *geography of man*. There may be no hemlock trees in the desert, no lions at the North Pole, no sagebrush in the rich bottom lands of a river, but there are men almost everywhere, for man is the most adaptable of all living things. It may seem that a desert stretch is too dry to support life; that a swampy region is too unhealthful to be safe; that a mountain range is too steep ever to be accessible; but if once man's ambition is aroused, he leads rivers to the arid land, drains the malarial swamp, and scales the lofty mountain to establish railroads or to sink his mines into its depths. He can face cold or heat, moisture or drought, but he does not thrive

equally everywhere, and in consequence, all parts of the earth are not evenly populated. The frigid zones furnish but a scanty living; the tropics take from man his ambition and his desire to work, and leave him lazy and content merely to exist; and it is therefore the temperate zones that people have most thickly settled. Man and the camel are the only animals that, unaided, can cross a desert. The one is educated or trained to overcome the conditions of his environment; that is, he "knows how"; the other is physiologically formed for desert life; he is "built that way."

Then there are the different races of men—the black, the red, the brown, the yellow, and the white. Is there any special cause for the differences that exist among them? Is there any reason why they live as they do—why the Caucasian race did not originate in Africa and the negro in Europe? See RACES OF MEN.

The subject of occupations, too, is fascinating. Is the principal occupation of a people determined by their character, the geographer asks himself, or does it determine that character? He finds, on careful study, that the two react on each other. Living conditions largely determine occupation, and if a country evolves naturally, there is a regular sequence of activities. First, when settlers are few and land is plenty, herding is likely to be the common pursuit, for each man may have a large acreage on which his stock may graze. But as more people are attracted to the region, each man's holdings become smaller and farming takes the place of pastoral pursuits, for not nearly so much land is necessary for agriculture as for stock-raising. The time comes, however, when the people become so closely crowded together that the soil cannot support them all, and manufacturing and commerce partly take the place of agriculture. There are, however, other determining factors, particularly climate, topography, and mineral content. Temperature and rainfall mark the boundaries of the cotton belt; the inclination of the earth's axis fixes the limits of the corn belt; glacial drift determines the loci of the best wheat lands; coal and water power control the area of manufactures; and harbors and easy trade routes very largely govern the commercial relations of men.

**Political Geography.** Natural conditions—climate, soil, mountains, seas—do not determine all of geography, for a part of it is man-made. Is there any reason, so far as physical features affect them, why the United States and Canada should be separated just where they are? Would not a far more natural dividing line between two possible countries have been the Rocky Mountains, that great barrier which people hesitated to cross for long years after the eastern part of the continent was settled? The branch of geography which deals with the social activities of the human race, with human governments, with the size and bound-

aries of countries, and with the location of cities, is called *political geography*. Very often geographic conditions show the closest connection with political. It is natural, for instance, that Great Britain, separated from the mainland of Europe, should have developed as a distinct country, or that Italy or Spain, jutting peninsulas with high mountains between them and the continental mass, should have an equally distinct existence. But in Central Europe, the various states of Germany had in many cases purely arbitrary boundaries, and it is not strange that there should have been constant friction, each state trying to widen its borders at the expense of others.

**Economic, or Commercial, Geography.** This is, in a sense, a part of political geography, since it is man-made, but it has been given special study and is usually considered a distinct branch. It treats of the industries of the world; of agriculture, and the reasons for its variations in different parts of the world; of raw materials and the principles which govern their manufacture into finished products; of mineral resources and why they are made the most of in some regions but neglected in others; of trade routes and transportation facilities, and the great part which commerce plays in the modern world.

The industrial and commercial phases have had a particularly close connection with political geography, in that they have determined so largely the location of cities. There was a time when the site for a city was chosen because it was easily defended, but to-day that question is seldom considered. The cities of Massachusetts are where they are chiefly because of the falls in the rivers, which furnish water power; London is the world's metropolis because it commands one of the most important trade routes in the world; and Duluth owes its growth to the fact that the iron which is mined not far from it is easily shipped from there by way of the Great Lakes. Such instances might be multiplied.

R.H.W.

### Interesting Ways of

**"Home" Geography.** There was a time, not so very many years ago, when a child beginning the study of geography took up one continent and then another, devoting about the same amount of time to each. He studied about the surface features, about the rivers, the people, and the industries, spending comparatively little time on industrial subjects. More time was devoted to his own country, perhaps, than to any other, but his own state received no special attention, and as for his home city or town and the activities that went on there, there was little or nothing said of them. In this day, all that is changed. Teachers realize that in geography, as in other sub-

### Studying Geography

jects, the pupil learns best if he proceeds from familiar things to those unknown, studying contrasts and similarities. Every little hill, every stream, every group of plants which the child sees on his way to school, may be made to do its part in helping him to picture the mountains, the rivers, the forests, or the prairies which he will find described in his textbooks. If he has ever watched the little sand flats deposited by a sluggishly flowing brook or ditch, he will have no difficulty in understanding the formation of the deltas of the largest rivers.

When one considers industrial phases, the value of home study is even more marked.

If the town has some one dominant industry, it may be made clear to pupils why that instead of some other industry has grown up there. Perhaps it is a flour-manufacturing town, because the wheat fields are not far away; perhaps the irrigated land about the town grows excellent beets, and beet-sugar factories are numerous; perhaps there are no manufactures, but the trade is large because the region round about is productive, and a lake, a river, or a great railroad makes transportation easy. It is far more worth while for a child to realize that geography has a determining influence on industries, and to understand in detail such industries as are available for study, than for him to be able to recite glibly the "principal products" of a list of foreign cities.

**Study by Comparison.** Having become familiar with his own town and his own state or province—and in some localities an entire year is devoted to the study of just that much of geography—the student, whether he be a pupil in school or someone who has taken up the study outside of school, is ready to proceed to gain an idea of wider areas; and to a dweller in Canada or the United States the “wider area” represented by his own country is very wide indeed. Yet too few actually realize the vast size of their home country. They may be able to recite statistics as to its area and population, but these make little appeal to their imagination. There is the inhabitant of British Columbia, for instance; does he know that his province, which is only one-tenth of the Dominion, would contain three times over the islands of the United Kingdom, that nucleus of the greatest empire in the world? Does the dweller in the so-called “Middle Western” section of the United States, in Illinois for example, realize that he is really an Easterner, since the geographical center of the country is in Kansas? Does it enter his mind that, possibly, his own state, with two others of almost equal size and fully equal resources, like Iowa and Ohio, could be placed in the state of California and that there would still be room to spare? The comparisons of this sort which can be worked out merely with the aid of a table of statistics are innumerable.

The articles in these volumes on the various states and provinces contain statistics as to area and population. With these as a basis, answer the following questions:

How does your state or province rank among the divisions of the country as to area?

How does it rank as to population?

How many states or provinces have a larger number of people to the square mile?

Has the largest state or province the greatest number of inhabitants?

If the population of the largest state or province were transferred to the smallest, what would be the

density per square mile? If the population of the smallest were transferred to the largest?

Which state or province has the greatest railway mileage?

Which has the greatest in proportion to area? In proportion to population?

If the most sparsely populated state or province were as thickly settled as the most densely, how many inhabitants would it have?

If this process were reversed, what would be the population of the one which at present has the greatest density?

Is the density of population of your state or province greater or less than that of the country as a whole?



FIRST MAP OF CUBA

So far as known, the above is a reproduction of man's first conception of the form of that island.

**A Wider View.** After gaining an idea of the home country, it will be interesting to bring into the comparison other countries, and such a chart as the following will prove very helpful in reaching an understanding as to comparative areas, populations, and other topics. Canada and the United States or one province and one state may be compared; it is possible

to vary the combinations widely. In making your study, substitute your own province or state for the one here given:

recent years more and more recognition is being given to this fact. No longer is the seeker after geographic knowledge made to fill

| DIVISION          | AREA IN<br>SQUARE MILES | POPULATION IN<br>ROUND NUMBERS | POPULATION PER<br>SQUARE MILE | RAILROAD<br>MILEAGE |
|-------------------|-------------------------|--------------------------------|-------------------------------|---------------------|
| Canada....        | 3,745,574               | 9,500,000                      | 2.5                           | 39,200              |
| United States.... | 3,000,000               | 131,000,000                    | 37                            | 270,000             |
| Ontario....       | 407,262                 | 3,000,000                      | 8                             | 11,000              |
| Illinois....      | 57,000                  | 7,500,000                      | 131                           | 12,200              |

**Boundary Lines.** Another interesting topic concerns the boundary lines of political divisions, whether countries or the minor divisions known as states and provinces. In very many cases, as stated above, these have been purely arbitrary, for this is the man-made phase of geography; but often physical conditions have had a strong determining influence, and it is interesting in the study of history to bear this subject in mind—to see whether countries shut in by natural barriers have had any less difficulty in holding their frontiers against enemies. Here, too, questions are perhaps more suggestive and illuminating than a discussion, but these are to be answered with the aid of maps and not of charts:

Are the continents political or physical divisions? Which continent is most completely isolated? Which are the least isolated?

Are there any continents so closely connected that they might almost be classed as one land mass? Is the boundary between them to any extent arbitrary?

Are North America and Central America separated by natural or by arbitrary boundary lines? Central America and South America?

How many countries of Europe have arbitrary boundary lines?

Would it have been reasonable to have placed the boundary between France and Spain at the Ebro River? Why?

Is there any apparent physical reason why Belgium and the Netherlands could not have been one nation? Germany and Austria and Hungary?

Is there any more reason why Russia should own Siberia than England, for example?

What other country has had the same advantage as Great Britain in building up a strong nation, reasonably safe from invasion?

Turning to Canada and the United States, locate several natural boundary lines between Canadian provinces. Locate twenty between the states of the Union.

Can you find instances where natural boundary lines might have been used, but arbitrary ones were chosen instead? Do you know the reason why, in any of these cases, the natural boundaries were rejected?

If, in the days of exploration and settlement, one nation had colonized the eastern coast of North America, another the western, would it have been possible for two nations to develop within the present borders of the United States? Where would the most natural boundary have been?

**The "Human Interest" Side.** Any student, whether adult or child, is naturally more interested in human beings than in things, and in

his brain with the "topographic features" of every country he studies, until any interest he may actually have felt in that portion of the world has died. If there are rugged mountains, broad valleys, marshy coast land, he learns about them, it is true, but they are related in some way to the life of the people. The mountains, perhaps, though barren and inhospitable, contain stores of gold, and have thus played a large part in the history of the country by attracting many people; the broad valleys are the most thickly settled parts of the country, it may be, while the swampy land supports its hordes of people, too, by furnishing just the right sort of land for rice-growing.

The people—their characteristics, their customs, their occupations, their needs—constitute the central factor in geography as it is studied to-day, and very interesting is the study of the connection between geography and people. The articles in these volumes on the various countries of the world lay especial emphasis on the people. So far as may be, if the inhabitants are enough alike to make possible any general statements, their physical and mental characteristics are sketched, and some attention is given to their modes of dressing and of living. In many instances, too, the articles are supplemented with pictures which tell more clearly than any description their story of the home life of the people. The way the women of Burma dress, the method of travel in China, the mode of life in an African village—these are but a few of the many stories the illustrations have to tell.

**Study by Outlines.** Another modern tendency which is too valuable to be a mere passing fad is toward the use of outlines. Too often children acquire information in the most illogical and jumbled manner; the ideas which they gain are correct, to be sure, but have no apparent relation to other ideas, equally correct, which are stored in other pigeonholes of their minds. Study according to an outline does away with much of this danger, and makes the lessons not only more interesting, but easier to remember. These volumes contain a great number of helpful outlines on geographic subjects. The articles CITY, PROVINCE, and STATE have general outlines which may be applied to the study of any of those geographical divisions, while each continent and each

important country have detailed outlines fitted for specific study. Questions accompany most of these outlines.

**Related Subjects.** In these volumes there are thousands of articles on geographical topics, and no attempt has been made to index them all here. They are all, however, readily accessible if the lists of related topics under many of the following articles be consulted. Under the article *EUROPE*, for example, are listed all the political divisions of the continent, such as *France*, and under each of these, in turn, are indexed the cities, rivers, mountains, and other geographic features. Each *state* and *province* likewise has its own list of related topics.

## MATHEMATICAL GEOGRAPHY

|                         |                    |
|-------------------------|--------------------|
| Aclinic Line            | Longitude and Time |
| Antarctic Circle        | Map                |
| Arctic Circle           | Meridian           |
| Axis                    | Minute             |
| Chart                   | Month              |
| Day                     | Pole               |
| Degree                  | Seasons            |
| Equator                 | Sidereal Time      |
| Globe                   | Standard Time      |
| Hemisphere              | Time               |
| International Date Line | Tropics            |
| Latitude                | Year               |
| Longitude               | Zone               |

## PHYSICAL GEOGRAPHY

|                   |                       |
|-------------------|-----------------------|
| Air               | Humidity              |
| Alluvium          | Hurricane             |
| Arid Region       | Hydrography           |
| Atoll             | Iceberg               |
| Avalanche         | Indian Summer         |
| Bad Lands         | Island                |
| Basin             | Isobars               |
| Blizzard          | Isothermal Lines      |
| Bore              | Isthmus               |
| Boulder           | Japan Current         |
| Butte             | Khamsin               |
| Calms, Regions of | Labrador Current      |
| Canyon            | Lagoon                |
| Cave              | Lake                  |
| Chaparral         | Land and Sea Breezes  |
| Chinook           | Lava                  |
| Climate           | Levant                |
| Cloud             | Lightning             |
| Cordillera        | Maelstrom             |
| Cyclone           | Mesa                  |
| Dalles            | Meteorology           |
| Delta             | Mirage                |
| Desert            | Monsoon               |
| Dew               | Mountain              |
| Dip               | Natural Bridge        |
| Divide            | Norther               |
| Dog Days          | Oasis                 |
| Doldrums          | Ocean                 |
| Dune              | Ocean Currents        |
| Dust, Atmospheric | Oceanography          |
| Earth             | Pampas                |
| Earth Currents    | Peninsula             |
| Earthquake        | Physical Geography    |
| Equinox           | Plain                 |
| Erosion           | Plateau               |
| Ether             | Prairie               |
| Fall Line         | Prevailing Westerlies |
| Fiord             | Quicksand             |
| Flood             | Rain                  |
| Fog               | Rainbow               |
| Frost             | River                 |
| Geyser            | Saint Elmo's Fire     |
| Glacier           | Savanna               |
| Gulf Stream       | Selvas                |
| Hail              | Simoom                |
| Harvest Moon      | Sirocco               |
| Haze              | Sky                   |
| Hill              | Snow                  |
| Horizon           | Snow Line             |
| Horse Latitudes   | Spring                |

|                 |            |
|-----------------|------------|
| Stalactite and  | Twilight   |
| Stalagmite      | Typhoon    |
| Steppes         | Valley     |
| Storms          | Volcano    |
| Talus           | Waterfall  |
| Thermal Springs | Waterspout |
| Tides           | Waves      |
| Tornado         | Whirlpool  |
| Trade Winds     | Whirlwind  |
| Tundra          | Wind       |

## ISLANDS

See list, in article *Island*.

## LAKES

See list, in article *Lake*.

## MOUNTAINS

See list, in article *Mountain*.

## OCEANS

See list, in article *Ocean*.

## RIVERS

See list, in article *River*.

## SEAS, GULFS, AND BAYS

|                     |                         |
|---------------------|-------------------------|
| Adriatic Sea        | Fundy, Bay of           |
| Aegean Sea          | Galilee                 |
| Arabian Sea         | Georgian Bay            |
| Azov, Sea of        | Guinea, Gulf of         |
| Baffin Land and     | Hudson Bay              |
| Baffin Bay          | Ionian Sea              |
| Baltic Sea          | Irish Sea               |
| Bengal, Bay of      | James Bay               |
| Bering Sea          | Long Island Sound       |
| Biscay              | Marmora, Sea of         |
| Black Sea           | Mediterranean Sea       |
| Bothnia, Gulf of    | Mexico, Gulf of         |
| California, Gulf of | Minas Bay               |
| Caribbean Sea       | Narragansett Bay        |
| Caspian Sea         | North Sea               |
| Cattegat            | Okhotsk, Sea of         |
| Chesapeake Bay      | Persian Gulf            |
| China Sea           | Puget Sound             |
| Darien              | Red Sea                 |
| Dead Sea            | Riga, Gulf of           |
| Delagoa Bay         | Saint Lawrence, Gulf of |
| Delaware Bay        | Skagerrak               |
| English Channel     | Solway Firth            |
| Finland             | White Sea               |
| Florida, Gulf of    | Yellow Sea              |
| Forth               | Zuider Zee              |

## MISCELLANEOUS

|                       |                 |
|-----------------------|-----------------|
| Africa                | Central America |
| America               | City            |
| Antarctic Lands and   | Europe          |
| Seas                  | North America   |
| Arctic Lands and Seas | Province        |
| Asia                  | South America   |
| Australia             | State           |

**GEOID, *je' oid*.** See EARTH (Form of the Earth).

**GEOLOGICAL SURVEYS**, though maintained by the governments of the United States and Canada at an annual expense of hundreds of thousands of dollars, are worth many times as much to the two countries. Organized primarily to aid geologists in their study of the past and present structure of the land, they also assist in the development of mineral resources by furnishing to the public reliable information about the location of various deposits. The topographical divisions prepare accurate maps of the country, which are the basis of all commercial maps, and are so full of detail that they save much of the preliminary survey work usually necessary for the construction of rail-

oads, canals, aqueducts, dams, and reservoirs. In the United States, the Survey has the additional duty of investigating favorable regions or irrigation systems, and choosing the location for dams and reservoirs in connection with them.

The United States Geological Survey, a bureau of the Department of the Interior, is preparing a huge map of the whole country which will display the contour of each section, and show the villages and cities, roads, railroads, and other artificial features in great detail. The map is to be published in sheets, each sheet representing an area contained within one degree of latitude and one of longitude. The scale varies from 1:250,000 (which is about one inch to four miles) for desert regions to 1:62,500 for districts thickly

settled. A similar undertaking in Canada is under way, and a few maps have been published, mostly of areas in the far West, but the forest areas of Quebec and Ungava are receiving attention.

The United States Survey was formed in 1879 as a consolidation of several independent surveys which had been operating in the West. Its organization was largely due to John W. Powell, the explorer of the Grand Canyon of the Colorado River. The Geological Survey of Canada is older than that of the United States, having been established in 1842. Its most famous director was Dr. George M. Dawson, for whom Dawson City, in the Klondike region, was named.

**GEOLOGIC COLUMN.** See GEOLOGY (Reading the Rocks).



**GEOLOGY**, the story of the earth, from its beginning through the millions of years that no man can number exactly, down to the present time.

**The Book of the Earth.** In studying geology, we learn to read the oldest, the largest, and the most fascinating book that man knows anything about—the book of the earth. We usually think of the Bible as the oldest book with which most people are familiar, and so it is if we consider only books with paper covers on which words have been printed. The book of the earth was begun long before there were any men to read it. It is truly a huge and heavy volume. The rocks are its leaves, and the remains of organisms that lived in ages past—fossils we call them—together with the plants and animals of to-day, are its letters and symbols. Some of the leaves are misplaced, and now and then we find that one has been torn out. Yet, though the record is not complete, the earth story as revealed in nature is wonderful beyond human comprehension.

**Nature and Scope of Geology.** Geology takes its name from *Gaea*, the old mythological name of the earth. To the ancients the storm at sea, the earthquake, or the rushing mountain stream was the manifestation of a living god (see section at the close of this article). The gods were the descendants of Mother Earth (*Gaea*) and Heaven (*Uranus*). Through the centuries since then, men have been observing the forces of nature and the changes taking place on the earth's surface, and have been

trying to explain them, but a genuinely scientific method of interpreting these phenomena was not evolved until the nineteenth century. Thus the story of the earth is a young science, though it deals with materials ages-old.

Geology is closely related, at one point or another, to all the other natural sciences. In its study of the constituent materials of the earth, geology touches the fields of physics and chemistry, through the allied sciences of mineralogy and petrology, which treat of the composition, properties, and origin of minerals and rocks. The study of fossils, so fundamental to geologic process, is itself a science—paleontology—through which geology is related to botany, zoölogy, and anthropology. Finally, the story of the earth's origin is a chapter in the literature of astronomy.

Geologists find the clue to what has taken place in past ages by observing the forces now at work in changing the surface of the earth. Hence, before they can reconstruct the history of the past, they must study the ever-changing present. The material immediately following gives a general survey of the agencies that today are changing the face of the earth. The processes are of two kinds: those that wear down the surface (processes of *erosion*), and those that build it up (processes of *deposition*), and the chief agencies are the atmosphere, water, organic life, and internal changes in the earth's crust.

**Work of the Atmosphere.** We live at the bottom of a great ocean of air that covers the earth like a mantle. This mantle, the atmos-

phere, is and always has been an important agent in modifying the earth's surface, and its effects are both destructive and constructive.

*Weathering.* Those processes by which rocks are broken up and formed into soil are collectively called *weathering*. The expansion of rocks by heating in the daytime and the contraction because of cooling at night, the opening of small cracks in the rocks through the freezing in them of water in cold weather, and the wear of rocks by waves, streams, and winds, cause them to break down gradually into ever finer particles. This mechanical reduction of solid rock to an aggregation of loose material is called *disintegration*, and the fragmental material produced by it is called *rock waste*. The chemical process by which rock is broken down is called *decomposition*. The atmosphere contains, among other gases, oxygen, carbon dioxide, water vapor, and often a little sulphur dioxide. All of these are brought down to the surface by rain, and enter into combination with minerals in the rocks. Some minerals are rather easily dissolved, and thus the particles of other minerals are separated and loosened. The physical and chemical changes thus go hand in hand in causing the rocks to crumble, and the loose material resulting is easily carried away by rain and streams, as well as by the wind. This transportation of rock waste from one place to another results in the lowering of the surface where the material is removed, and in the raising of the surface where the material is deposited. The processes of erosion, transportation, and deposition, known collectively as *gradation*, thus bring about marked changes in the form of the surface. In this work, wind and rain play an important part.

The atmosphere is constantly in motion and the air currents carry along more or less solid matter. An ordinary wind will move fine sand and a strong wind will move gravel; hence winds are constantly changing some portions of the earth's surface. Such changes are most striking in sandy regions, especially on beaches and in desert lands, where the surface is very dry. Where there are ledges of rock, the constant hurling against them of particles of sand and dust wears them into fantastic forms, as in the Garden of the Gods, in Colorado.

The air also helps to modify the surface of the earth through the agency of rainfall. Rills formed by the running together of numerous raindrops carve gullies and ravines in places where the land is soft. Soil is also moved down slopes by rain wash. Rain is also the source of the water of springs and streams, whose erosive effects are considered in the next section.

**Work of the Hydrosphere.** The hydrosphere includes both the running and the

standing water on the earth's surface, whether in the oceans and seas, or in springs, rivers, lakes, and swamps. All of these are important geologic agencies. Ocean waves wear away the shore and spread the detritus over the sea floor, or cast it up to form beaches. In many places, they hollow out caves in the rocks or cut the rocks into curious forms. Ocean currents move so gently that they do not affect the form of the coast except along stretches of sandy shore, but they exert a great influence on climate, including rainfall, and so indirectly cause changes on the land. Similar processes are going on along the shores of lakes, though not as a rule so vigorously as on the seacoast.

Mention has been made of the erosive work of rills formed by raindrops. Streams carry on the same work, but on a larger scale. The cutting action of a stream may form a wide valley with gentle slopes, or a deep canyon with precipitous sides, such as the gorge carved by the Colorado River in Arizona. The constructive work of streams, in the formation of flood plains and deltas, which are built from the sediment transported by the water, is as striking.

That part of the rain that sinks into the earth is called *ground water*. The quantity of ground water in a locality is dependent on the rainfall, the topography, and the underground conditions. It percolates downward into the rocks and fills the crevices and pore spaces in them up to a variable level, called the *water table*, which falls in a dry season and rises in a wet season. Wells, springs, geysers, and subterranean streams derive their supply from ground water. In percolating through the rocks, ground water dissolves some of the minerals and thus enlarges the crevices. In soluble rocks, such as limestone, great caverns, like Mammoth Cave, in Kentucky, and Carlsbad Cavern, in New Mexico, are sometimes formed. The dissolved mineral matter in the water of wells and springs is derived in this way. Most of it is eventually carried to the oceans by rivers, and thus the salinity of the ocean is slowly increased.

*The Work of Ice.* The importance of ice as a geologic agent warrants its treatment under a separate head. In the colder parts of the world, much of the breaking-down of the solid rocks is due to the expansion resulting from the freezing of water in the crevices of rocks. Again, the alternate freezing and thawing of water in the soil loosens boulders and causes landslides and other movements of rock masses.

Ice contracts at temperatures below the freezing point, and the alternate expansion and contraction of a large mass of ice, such as that which forms over the surface of a lake, produces marked effects. When it first freezes, the ice exactly covers the lake surface, but a fall of

temperature causes cracks to form because the contracting ice breaks apart. Water from beneath fills these crevices and freezes, and again there is an unbroken surface. When the temperature rises, the ice expands, and in overriding the shore it may shove up ridges of earth and stones. The rock walls on the shores of many lakes are the results of such a process. Also, the anchor-ice that forms along the banks of streams holds in its grip large masses of earth and rock that, carried away when the ice breaks up in the spring, may be deposited farther downstream.

The erosive action of large sheets of ice and the deposition of the material that they collect are described elsewhere in these volumes under GLACIER. In past ages, the effects of glacial action were tremendously greater than any observable to-day (see GLACIAL EPOCH).

**The Work of Plants and Animals.** Since life first developed on our globe, plants and animals have been contributing to the processes of geologic change. They, too, use both mechanical and chemical methods. During life, plants decompose the carbon dioxide of the air; after they die, the carbon that they have stored in their tissues is added to the soil as they decay, being eventually changed again, by oxidation, into carbon dioxide. This and other compounds of organic origin help to decompose rocks and to form soil. Living plants split rocks mechanically by the growth of their roots and stems that have penetrated crevices in the rocks. Swamps, marshes, and peat bogs are examples of the effects of plant life under particular conditions. They are formed in shallow-water areas by plants that grow so profusely that natural drainage is checked. Peat (which see) represents the partial decay of vegetation in a marshy area.

Animals that live in the ground assist the process of erosion by burrowing into the soil. Man himself changes topography on a large scale by digging canals, leveling hills, tunneling through mountains, cultivating soil, draining swamps, constructing reservoirs, and so on. Another outstanding example of the work of animal organisms is the building of coral reefs and islands. These are made up of the limy shells of small marine animals.

**Earth Movements and Volcanoes.** Elsewhere in this article, there is an account of the great movements by which our earth has taken on its outstanding features—the arrangement of seas and continents, of mountains and plateaus. It is important to know that movements of the rocky crust are still taking place; for example, though the process is so gradual that it can be noted only by careful and long-continued observation, the Pacific coast of America is rising, and the Atlantic coast from New England to Virginia is sinking. The agencies that tend to elevate the land

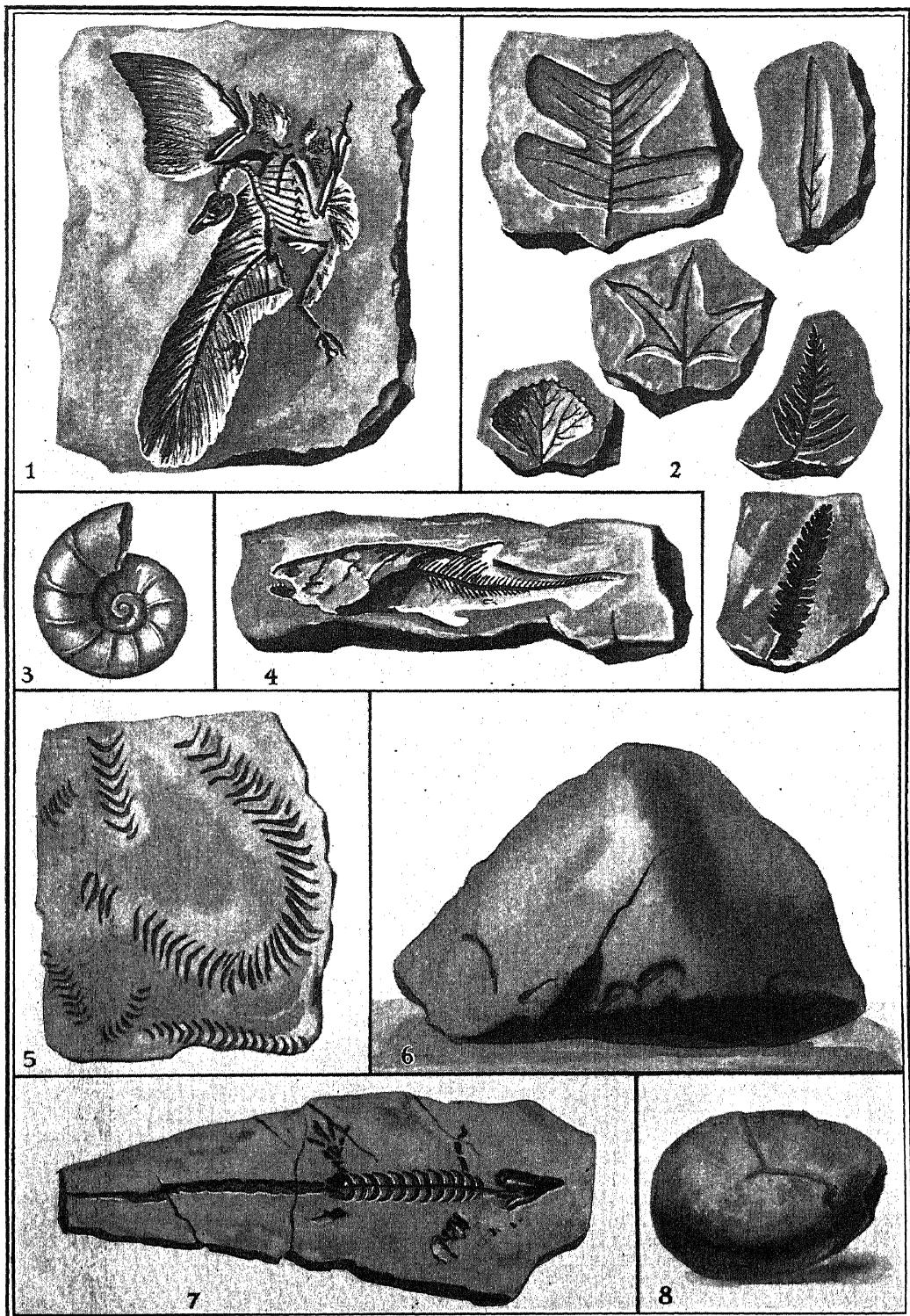
(the forces of *diastrophism*) are in endless conflict with those that tend to wear it away. Were it not for this conflict, the whole land surface of the earth eventually would be reduced below the level of the sea, and our globe would be covered by a shoreless ocean. It is possible that some such fate will overtake the earth millions of years from now.

There are some earth movements that occur suddenly and have effects easily recorded. Earthquakes are frequent enough over the world to be commonplace, though violent quakes in thickly settled areas appal us because of the destruction wrought by them. Earthquakes are tremors in the earth's crust, caused by faulting or readjustments of rock masses.

A volcano is another geological agent whose effects are easily seen. In times past, eruptions giving rise to great lava flows have built up plateaus. Lines of volcanic cones have been formed by the partial closing of fissures through which lava has escaped. Many bold and picturesque rock formations are the result of the erosion of lava that originally solidified beneath the surface of the earth. Some mountains and some lakes are of volcanic origin. Though a violent eruption may destroy plant and animal life, in the course of time fertile soil is formed from the ejected material.

**Origin of the Earth. General Facts.** The earth's diameter is a little less than 8,000 miles and its circumference is not quite 25,000 miles (see EARTH). It is not a true sphere, as its polar axis is twenty-six miles shorter than its diameter at the equator. This is a slight difference compared with the size of the earth and can be detected only by careful measurement. The fact that there is a difference is, however, important. As the earth's form is that which a yielding globe would assume if rotating on its axis, scientists have concluded that the earth in its early stages was plastic, but there is no general agreement as to whether it was at first gaseous, liquid, or solid. Most geologists believe that even a solid globe might assume such a form under the tremendous stresses induced by rotation.

**Hypotheses of the Earth's Origin.** During the nineteenth century, most scientists accepted the *nebuliferous hypothesis* of Kant and Laplace as a reasonable explanation of the origin of the solar system. In brief, it assumes that the sun and planets were formed from an enormously extended mass of hot, luminous vapor that tended to become a globular, rotating nebula, which gradually cooled and contracted, and hence rotated more rapidly. Eventually it threw off a succession of rings that condensed into globes, each rotating on an axis. Thus the planets were formed, and the nucleus remaining became the sun. Because more



**Unknown Ages Old.** (1) The earliest known bird—Upper Jurassic beds. (2) Fossilized leaf forms—Cretaceous and Pennsylvanian. (3) Fossilized snail—Triassic. (4) Fossilized fish—Devonian. (5) Track of unknown animal—Cambrian. (6) A stony meteorite. (7) A microsaurian—Pennsylvanian. (8) Fossilized egg.

recent discoveries have thrown considerable doubt on the nebular hypothesis, it has been generally abandoned, at least in its original form.

In 1900 Chamberlin and Moulton propounded the *planetesimal hypothesis*, which, though it has not been generally accepted in all its details, gave a new and powerful impetus to the study of the whole problem. According to this hypothesis in its present form, hundreds of millions of years ago another star passed closely enough to our sun to detach from it, by gravitational attraction, masses of sun-substance from which the planets, planetoids, and satellites have been formed. The material separated from the sun remained under the influence of its attraction and revolved about it. Because different masses differed in density, the heavier ones attracted the lighter material and formed knots of matter that became the nuclei of the planets and satellites. These were gradually built up by the infall upon them of the more widely dispersed material, now grown cold. This consisted of myriads of small masses—the *planetesimals*—which ranged in size from particles of dust to large meteors.

The theory of a tidal disruption of our sun by a passing star is now generally accepted by astronomers and geologists as explaining the origin of the solar system, but there is a wide difference of opinion regarding the details of subsequent events. Chamberlin and Moulton hold that the earth grew up slowly as a cold, solid mass, because the planetesimals were too small to bombard the growing planet with force enough to heat it to a molten state, "except perhaps at the little spots where the small bodies fell." Harold Jeffreys and J. H. Jeans, English physicists, maintain that at the time of its disruption the sun was a cold, gaseous mass, and that the earth was at first gaseous, then liquid, and finally solid, the whole series of changes consuming a great many million years. Joseph Barrell, an American geologist, accepted the theory of a hot sun partly disrupted by a passing star, but he held that the planetesimals in the dispersed matter were relatively large and fell upon the solid nucleus rapidly and with such force that the heat generated by their infall quickly liquefied the outer part of the earth, and possibly the deep interior. As the bombardment of particles slackened, the earth began to cool and after a time solidified again. This theory of Barrell is favored, at least in its broad outlines, by many American geologists.

**The Structure of the Earth.** As yet, man has merely scratched the surface of the earth; the deepest mines and borings are not much more than a mile in depth, and it is almost 4,000 miles to the earth's center. Nothing is positively known regarding the earth's in-

terior, but geophysicists have been able to make certain reasonable inferences regarding it. It was formerly believed that only a thin crust of the earth had solidified and that the interior is hot and molten. It is still believed that the interior is hot, because (1) lava and hot vapors are emitted by volcanoes; (2) hot springs, in some of which the water is at the boiling point, are found in many parts of the globe; and (3) in mines and borings the temperature increases at the rate of about  $1^{\circ}$  F. for each fifty or sixty feet of descent.

There are several reasons, however, for rejecting the idea of a molten interior. Observations of earthquake tremors show that transverse vibrations are transmitted directly through the earth, and, so far as known, such vibrations are not transmitted by liquids. Again, the earth is a huge magnet and must consist largely of magnetic material. Moreover, the density of the earth as a whole (5.5) is twice that (2.75) of the rocks in the earth's crust. The central part, therefore, must consist of material of high density, under great pressure, and now generally supposed to be solid. In other words, the earth appears to have a concentric zonal structure; that is, a vertical section from center to circumference would show a succession of different sorts of material, progressively decreasing in density from the center outward.

The earth's internal zonal structure is believed by geophysicists to be about as follows: The core of the earth is solid, probably very hot, has a density of 10 to 12, and consists mainly of iron and nickel. This core, called the *centrosphere* or *barysphere*, is estimated to be about 4,000 miles in diameter. It is enclosed by a shell, nearly 1,000 miles thick, of mingled nickel-iron and very dense rock. Some geophysicists believe that there is an abrupt change in constitution from the centrosphere to the enclosing shell, but others hold that there is a progressive decrease in the proportion of metal from the centrosphere outward through the thickness of the shell. Next outside the "iron-rock" shell is another, also nearly 1,000 miles thick, of rock that is mainly of basaltic composition. The outermost shell, to which some restrict the name *lithosphere*, is of rock of an average density of about 4.0 and mainly of granitic character. Some geologists hold that the granitic shell does not continuously enclose the basaltic shell, but that it forms only the continental masses—isolated patches, as it were, lying on the basaltic shell, which forms the floor of the great ocean basin. The granitic shell occupies the surface of much of the continents, but in many areas it is covered by a veneer of sedimentary rocks and surficial material. These rocks are possibly twenty-five miles thick in some deep sedimentary basins, but their

average thickness is not more than half a mile. Strictly speaking, they are a part of the outer shell, but their entire bulk is almost negligible compared with that of the granitic rock that forms most of that shell.

**Origin of the Air and Water Spheres.** According to the planetesimal hypothesis, the earth's primitive atmosphere was formed from such planetesimals as were gaseous and from gases liberated by the impact of planetesimals against the earth. When volcanic action began, water vapor, carbon dioxide, and other gases were liberated and contributed to the growth of the air envelope. In time, the atmosphere became saturated with water vapor, and rain fell on the earth. This was the beginning of the hydrosphere.

Geologists who favor the theory of a molten earth hold that gases were liberated from the earth material in the process of liquefaction and that the primitive atmosphere consisted chiefly of water vapor, but included some carbon dioxide, carbon monoxide, chlorine, hydrochloric acid, and nitrogen. There was no free oxygen because no green plants existed to separate it from the carbon dioxide. Near the earth's surface the gases were intensely hot. Carried up by convection currents, they were cooled at higher levels, and vast clouds were formed through the condensation of water vapor. When the surface had solidified, the incessant rain penetrated the hot crust to be dissipated as steam. After a long time the crust became cold, rain water collected on its surface, and the ocean was born. To it were added quantities of water-forming gases, released from rocks that had melted in the interior where the pressure was relieved, and had been erupted through the crust. The atmosphere, meanwhile, grew rarer by losing water vapor and by acquiring new volumes of carbon dioxide from the eruptions. Even at the present day, water vapor and other gases are brought to the surface in volcanic eruptions, and are added to the atmosphere and, in part, to the ocean.

**Continents and Ocean Basins.** Following the theory just outlined, a possible cause of the differentiation of the earth's surface into continents and oceans may be found in vast eruptions of basaltic lava. According to this suggestion, these flows broke through and overflowed the lighter crust of rocks. This process, repeated many times and on a gigantic scale, caused the granitic rocks to yield to the great weight above them. Thrust sidewise by the weight of the basalt, the granitic rocks buckled up as continental segments, while the basalts sagged to become the floors of oceanic depressions, which were filled by the water of the primordial ocean. However, the oceans were not all formed at the same time, and the areas occupied by the continents and the

oceans have varied throughout geologic history.

**Isostasy.** Gravity observations at different points on the earth's surface reveal considerable differences in density within the earth's outer shell, that is, within an assumed depth of fifty to seventy-five miles. For example, the rocks beneath the ocean basins appear to have a greater density than the continental masses, and mountainous areas to have a less density than the average for the continents. According to a theory that is receiving serious consideration, the continents stand above sea level and the mountains above the plains because, being composed of lighter material, they rise until they attain a position of equilibrium, just as an iceberg does when floating in water; and the ocean basins have sagged because the rocks beneath them are heavy. *Isostasy* means *equal standing*, and pressures at the assumed level of *isostatic compensation* are everywhere equal, according to this hypothesis. The tendency of the lithosphere to attain isostatic equilibrium produces elevation of lighter material, subsidence of heavier masses, and other topographic changes, involving a sort of evening-up, balanced by an assumed flow of material in the deeper zone of compensation. Though the principle of isostasy is accepted by many geologists, its application is presenting considerable difficulty, as it is directly opposed by many facts of structural and historical geology.

**Mountains and Plateaus.** Mountains owe their origin to one or more of three geologic agencies: igneous activity, erosion, and dynamic movements of the earth's crust. Volcanoes built up by successive eruptions, and dome-shaped mountains formed by the accumulation of lava beneath sedimentary strata, are types of igneous mountains. Erosion produces mountains by removing parts of the rocks of uplifted areas, leaving the remainder standing above the surrounding region. The Catskill Mountains in New York are of this type. Most mountains have been formed by folding and other deformation of the crust, followed by erosion that has developed the present form of the mountains. The cause of these deformations is not understood. Some geologists assume that the interior of the earth is contracting, and that folding of the outer rocks results from the adjustment of the crust to the lessened circumference. There are various hypotheses to account for such contraction, but none has been generally accepted. One of the problems that geologists are studying is the relation of folding to isostatic adjustment (see MOUNTAIN; PLATEAU).

**Reading the Rocks.** When the molten earth had cooled and land had appeared, wind and rain began their work of erosion and the first sediments were laid down. Since then there has been removed from the land surface by

erosion an amount of material whose thickness is estimated to be perhaps two miles. This material has gone into the formation of the rocks that make up the *geologic column*, from which geologists read the history of the past. The story read in the rocks is not an unbroken record by any means. It has been deciphered from the rocks in places where the strata are exposed by erosion, or in artificial exposures. Here and there, in one land or another, all over the world, the story has been read and the records have been pieced together as completely as possible with the data available.

In some sections, strata were deposited in regular order, one on top of another, and in places, hundreds of feet of sediment of various sorts were thus quietly and uninterruptedly accumulated. In other sections, strata dipping at one angle overlie strata dipping at another angle, the surface of contact between the two cutting diagonally across the underlying beds. In any case, wherever strata have clearly been deposited upon others, they must inevitably be younger than those upon which they lie. By comparing and matching innumerable stratigraphic sections in all parts of the world, and by noting the fossils found in the successive strata, the geologic sequence of the formations has been determined and a basis established for the subdivision of geologic time.

**Divisions of Geologic Time.** Geologic time, based on such reading of the geologic column, has been divided into eras, and these in turn into periods, which are subdivided into epochs. Eras are distinguished by marked alterations in plant and animal life and by widespread geologic changes; the divisions of lower rank are distinguished by minor crustal disturbances and less pronounced organic changes. The names of the eras end in *zoic*, from the Greek word for *life*. The earliest era, the *Archeozoic*, was the time of *very ancient life*, and the next, the *Proterozoic*, was the time of *earlier life*. *Paleozoic*, the name of the third era, refers to *old life*; *Mesozoic*, the name of the fourth era, to *middle life*; and *Cenozoic*, that of the latest, to *recent life*. The chart on page 2739 includes the divisions of geologic time generally accepted by American geologists. It should be read from the bottom upward, the latest strata being at the top of the table.

It has been held by some geologists that each era comprised a time of deposition, followed by mountain-building, continental elevation, and a long interval of erosion, when little sedimentation took place, and that there are, therefore, breaks in the succession of strata in the geologic column, representing time intervals between the eras. These are indicated in some tables by the use of the prefix *epi* or *ep*, meaning *upon* or *after*. Thus the

hypothetical interval between the Archeozoic and Proterozoic eras is called *Ep-Archeozoic*.

**Duration of Eras.** The relative length of the eras is estimated from the number and thickness of their systems of strata, though such data do not afford a basis for determining the length of each era in years. It is certain that the duration of cosmic and geologic time has been almost incredibly long. A generation ago, Lord Kelvin computed the age of the earth as 20,000,000 years, based on the rate at which the planet was supposed to have been losing heat since the formation of the solar system. Geologists, however, held that such a short time was by no means adequate for the geologic changes that have taken place. The discovery of radioactivity and the results of modern research in regard to atomic structure have wholly altered the situation. The approximate age of minerals containing two radioactive elements, one of which is derived from the other, can be computed from the relative amounts of the two elements, and the known rate of change from one to the other. The results of such computations make the age of the earth much greater than that assigned by Lord Kelvin.

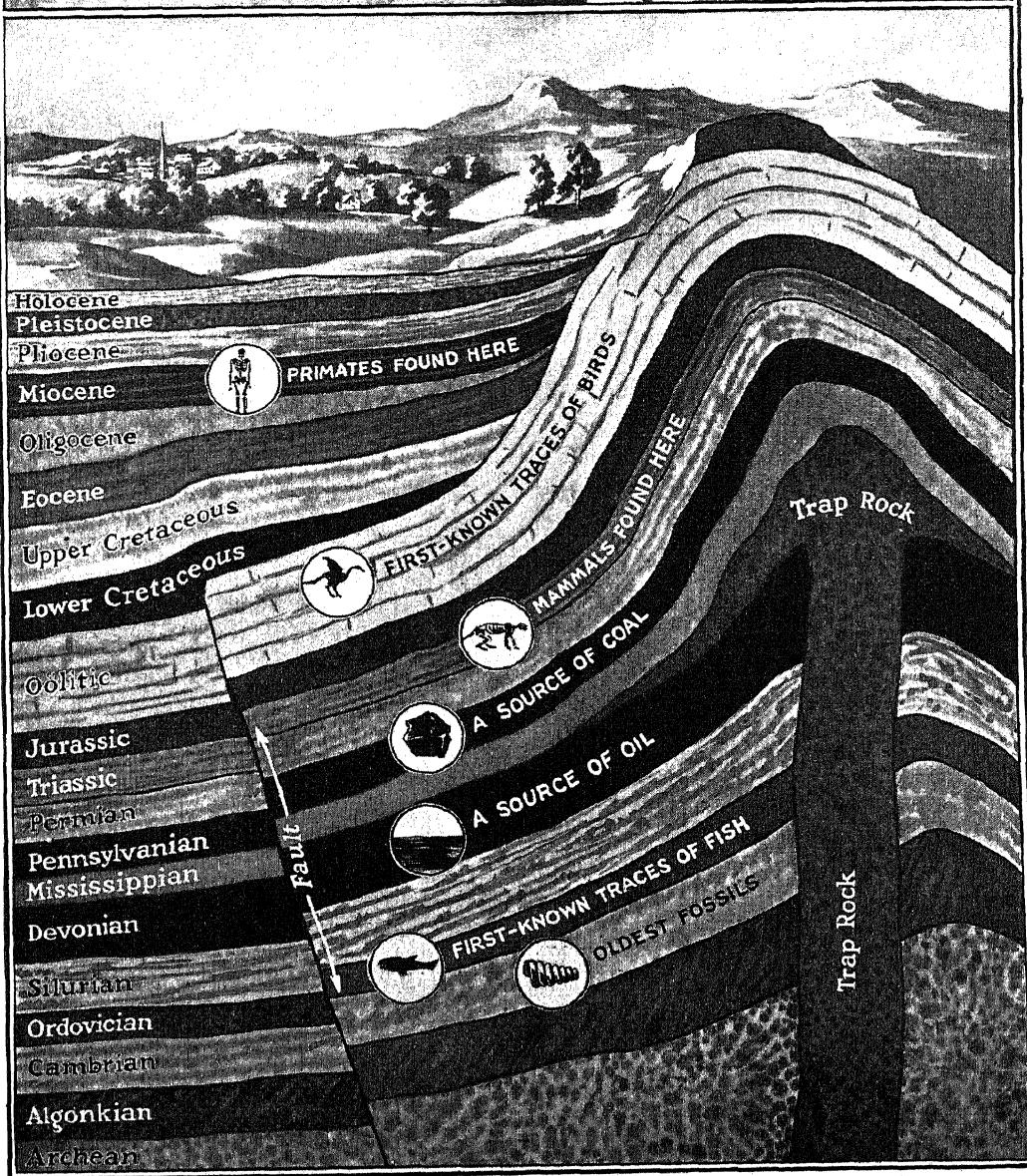
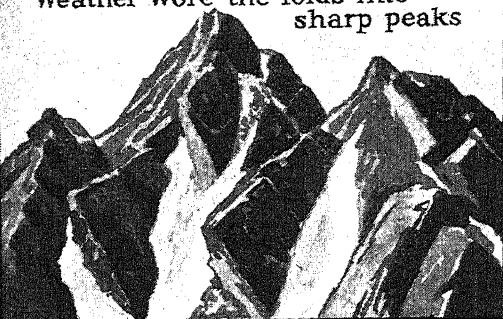
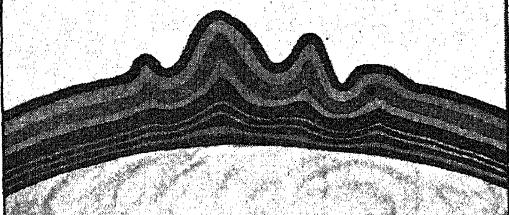
From various lines of reasoning, most geologists estimate the length of time since the disruption of the sun as not less than 1,000 million years. The time since the first sediments were deposited is conservatively estimated at 500 million years, some estimates being considerably greater and a few somewhat less. Barrell allots fifty-five per cent of this time to the Archeozoic and Proterozoic eras, thirty per cent to the Palaeozoic, eleven per cent to the Mesozoic, and four per cent to the Cenozoic. The results of the principal methods of calculation of the age of the earth have been compiled in the following table by Professor Arthur Holmes. The estimates cover the time from the formation of the earth as a planet.

The earth's age, computed:

- (a) From the eccentricity of the orbit of Mercury—between 1,000 and 5,000 m.y. (millions of years).
- (b) From the tidal theory of the origin of the moon (the theory that the moon was detached from the earth by the tidal attraction of the sun when the earth was still fluid)—less than 5,000 m.y.
- (c) From the journey of the solar system from the Milky Way—between 2,000 and 3,000 m.y.
- (d) From the average quantities of lead and of radioactive elements in the rocks of the earth's crust—less than 3,000 m.y.
- (e) From the oldest radioactive minerals that have been analyzed—greater than 1,400 m.y.
- (f) From the accumulation of salt in the oceans—greater than  $n$  (any multiplier) times 330 m.y.
- (g) From the thickness of the geological formations—incalculable.
- (h) From the conception of cycles and revolutions in the earth's history—over 1,400 m.y.

Mountains formed by folding or wrinkling of earth's crust

Weather wore the folds into sharp peaks



The Story of the Growing Earth. The various periods and systems graphically outlined, picturing the slow development of life.

[Professor Holmes himself sets 1,600 m.y. as a minimum, and 3,000 m.y. as a maximum]

**The Story by Eras.** It is difficult to make any sharp distinction between the end of the formative stage of the earth's history and the beginning of the Archeozoic Era, but most geologists consider the Archeozoic to have begun when weathering came into action and sediments were first deposited. It was a time of violent igneous activity, and the Archean formations consist of both sedimentary and igneous rocks, greatly deformed and metamorphosed. No fossils have been found, and if any had been entombed in the rocks they would have been destroyed by metamorphism. However, life probably appeared on earth during the era. The sedimentary rocks contain carbon, which to-day is derived from carbon dioxide by plants, and it seems probable that the same process went on early in the earth's history. There are indications of the existence of microscopic algae, bacteria, one-celled animals (protozoans), and simple larval forms of many-celled animals. As the separation of carbon from carbon dioxide implies the liberation of oxygen, the carbon deposits in the Archean rocks indicate that the atmosphere was becoming rich in free oxygen.

During the Proterozoic Era, sedimentation for the first time became the principal process in the formation of rock. There is, however, considerable igneous rock with the sedimentary formations. During the era, the iron ores of the Mesaba Range, in Minnesota, and of other Lake Superior districts in Michigan and Wisconsin, were formed. Fossils of several primitive forms of plant and animal life, including sponges and worms, have been found. Other indications of life in Proterozoic time are the limestones and the carbonaceous shales and slates deposited then. Late in the era, the earliest known widespread glaciation took place.

The Cambrian, the first period of the Paleozoic Era, is of special interest and importance, because its rocks constitute the oldest system known that contains abundant fossils. It is therefore the earliest fairly satisfactory record of life. This system comprises all the common sorts of sedimentary rocks—conglomerates, sandstones, shales, and limestones. Some of the sandstones have been changed into quartz schists, some of the shales into slates, and some of the limestones into marble. Most of the fossils represent the shells or tracks of marine animals, but the absence of fossils of land species does not prove that no life then existed outside of the sea. Every great division of the animal kingdom except the vertebrate (back-boned) animals is represented, but even though no vertebrate fossils have been found in the Cambrian rocks, geologists are not prepared to say that there were then no vertebrate animals.

Among the invertebrates were several kinds of mollusks, sea worms, sponges, a few forms of the protozoan group (see PROTOZOA), and corals. Traces of soft jellyfish have been preserved. The most highly organized of the Cambrian animals were the trilobites, now extinct, which were crustaceans (see CRUSTACEA). It is supposed that with the abundance of animal life there was a corresponding abundance of plant life, to furnish the needed food supply. Geologists also infer from the shells, plates, and other forms of protective covering characteristic of so many animals of the Cambrian Period that other species existed of which no fossils have yet been found, and against which the known animals needed defense.

It is not possible here to take up in detail each of the succeeding periods, but certain striking developments may be pointed out. The fossils of the next period, the Ordovician, are almost entirely those of marine invertebrates, but among them are the oldest remains of fishes. The dominant group of animals is the Cephalopoda (which see), the highest class of mollusks. Some of these grew to immense size, bearing shells fifteen feet long and a foot in diameter. On the land there were flying insects, implying the existence of vegetation and of an atmosphere that would be adapted to air-breathing creatures. The record of land plants, however, is meager and unsatisfactory.

The Silurian Period was marked by the formation of coral reefs, the first appearance of scorpions, and a rich and varied development of echinoderms (which see). Fossils of land life are scant, and likewise little is known of the plant life in the sea. Following this period was the Devonian, some of the rock formations of which are of importance commercially. The Upper Devonian, for example, is the chief source of oil and gas in Western Pennsylvania, and one of the sources in West Virginia; and the Middle Devonian in Ontario produces oil. The Old Red Sandstone of Great Britain and Ireland is of the Devonian age. In certain sections of Germany, large quantities of iron, tin, and copper have been taken from the Devonian rocks.

During the Devonian Period, marine fishes were abundant, and there were sharks having fin-spines a foot in length. Barnacles of the modern *sessile* type, that is, attached directly by the base to other objects, made their first appearance, and there appeared and declined in this division of time a strange animal called *ostracoderm*, which formed a link between arthropods and vertebrates. It was related to the fishes, but entirely lacking in vertebrae. Plants, snails, insects, myriapods (thousand-legged worms), scorpions, and amphibians (which see) are known to have lived

on the land, and the Devonian Period saw the origin of ferns and of the gigantic progenitors of horsetails, or scouring rushes (see HORSE-TAIL). Fernlike plants predominated.

The Carboniferous Period, divided into the Mississippian, Pennsylvanian, and Permian epochs, was an especially important epoch in geologic history, from an economic standpoint. To the second division belong the rich coal measures of Pennsylvania (anthracite and bituminous), Michigan, Illinois, and the states from Iowa to Oklahoma, and Nova Scotia and New Brunswick (see COAL). Iron ores of the system occur in Pennsylvania and Eastern Ohio, and oil and gas in Pennsylvania, Oklahoma, Kansas, and Illinois. In Europe, workable coal is found in Great Britain, Ireland, Belgium, France, Spain, Germany, Austria, and Russia, and the system is coal-producing elsewhere, as in China and Brazil.

In the Mississippian rocks are found the earliest wood which shows rings, but the record of land life as a whole is inadequate. Sharks were supreme in the open seas and were more abundant than in any later period. On the other hand, the record of land life of the Pennsylvanian Epoch is unusually full. Gymnosperms (plants whose seeds are not enclosed in a seed-case) were very abundant. Giant ancestors of the modern horsetails grew in the forests to a height of sixty to ninety feet, and there were abundant growths of huge club mosses and fernlike plants. Since coal is of vegetable origin, the coal measures bear wonderful records of the complex plant life of the Carboniferous Period.

Animal life was also abundant. On the land lived amphibians, insects (including cockroaches, locusts, crickets, and bugs, but no moths, butterflies, or flies), spiders, scorpions, myriapods, and land snails. In the later coal measures, fossils of amphibians (the first land vertebrates) are first found in abundance and variety. Another important feature of the period was the development of fresh-water fishes, mollusks, and crustaceans.

In the Permian Epoch there were gigantic geographic changes through which great areas of sea bottom were converted into land, and both plant and animal life became greatly impoverished. Of the new plant types which appeared, one is thought to be the ancestor of the group which includes the giant sequoia (which see). Before the end of the epoch, the amphibians were overshadowed in numbers by the reptiles, their probable descendants. Though the differentiation between the two groups began earlier, the reptiles did not appear as a large and complex division until well into the Permian. Marine life was greatly depleted, but the fresh waters teemed with fishes of a somewhat modern character. The Permian age presents some interesting and

difficult problems. For example, there appears to have been widespread glaciation in India, Africa, and Australia, near and within the tropics, and at low altitudes.

The Triassic Period, which ushered in the Mesozoic Era, was characterized by an extraordinary development of reptiles, including crocodiles, flying saurians, lizards, and other scaled reptiles. Before the period closed, certain reptiles had made their home in the sea. There also appeared the race of dinosaurs (see DINOSAURIA), ungainly monsters that attained full development later in the era. The Triassic rocks also contain fossils of a primitive form of mammals.

The Jurassic Period was characterized by an extension of the seas, as a result of which marine life again assumed a leading place in the geologic record. Among the fishes were forerunners of the modern garpikes and sturgeons, and various sea reptiles made their appearance. Land life is especially interesting, in that it exhibits slow progress toward types that exist to-day. The leading plants were cycads, conifers, ferns, and horsetails. Among the animals were flesh-eating and herb-eating dinosaurs, some of the latter reaching a length of sixty feet. The herbivorous dinosaurs, which are first known in the Jurassic System, were horrible-looking monsters, but unwieldy and stupid. In this period, flying reptiles reached full development. Though small at this time, they later attained a wingspread of nearly twenty feet.

Of especial importance is the differentiation in this period of the oldest known bird, a descendant of the reptiles. It had reptile-like claws, but its front limbs were adapted for flying and it was clothed with feathers. Traces of its reptilian ancestry may be seen in its long vertebrated tail and its toothed jaws. Up to this time the fossil record of mammals is very meager.

The Mesozoic Era ended with the Cretaceous Period, divided into Lower and Upper Cretaceous. By some geologists the Lower Cretaceous is regarded as a separate period, called Comanchean. The Lower Cretaceous was characterized by one of the most striking evolutions in the history of plants—the appearance and widespread development of angiosperms (which see), plants whose seeds are enclosed in a seed-case. (It is possible that they had their origin in the late Jurassic Period.) With the development of flowering plants, there was probably a corresponding development of insect life.

The Upper Cretaceous was preëminently the coal period of the western part of the North American continent. It was marked by extraordinary volcanic activity. Plant life on land began to assume a modern aspect, and among the present-day genera which appeared

were those which include the birch, beech, oak, walnut, sycamore, tulip tree, and maple. Grasses had their origin in this age, and palms grew abundantly. The most important plants that support animal life made their appearance, laying the foundation for the future marvelous evolution of the higher animals. Reptiles, especially dinosaurs, continued their dominance among land animals; birds existed both on land and sea, but the marine birds were the more important. Turtles, some of enormous size, appeared for the first time in the ocean.

The Cenozoic Era comprises the time from the end of the Mesozoic Era to the present day. The transition of life from the Mesozoic to the Cenozoic was characterized by four significant features: the appearance of new marine species; the practical disappearance of the great saurians and decided changes in other reptiles; the dominance of mammals; and the continuance of large numbers of Mesozoic land plants. Throughout the Cenozoic there was steady progress toward life as it now exists. Before the close of the Eocene Epoch nearly all existing groups of mammals had become well defined. Primitive types of the horse, pig, hippopotamus, camel, dog, and opossum appeared, and some mammals, like the land reptiles of the preceding era, took to the sea. Thus originated whales, dolphins, porpoises, manatees, dugongs, seals, and sea lions. Nearly all types of marine invertebrates had assumed their modern forms.

The evolution of the higher animals through succeeding epochs need not be discussed in detail. Representatives of primates, the highest order of mammals, to which man himself belongs, appeared in the Miocene Epoch, but the geologic record is singularly meager in regard to the origin of the human race. One modern theory holds that the desert of Mongolia is the original home of mankind, and investigations are being made in that region to test this hypothesis. It is also an unanswered question whether or not man existed in North America during the Pleistocene Epoch (see GLACIAL EPOCH), when thousands of square miles of its surface were covered by thick ice

sheets. This and many other questions must be left to future investigations and discoveries.

**Geology and Mythology.** We say, sometimes, without realizing that we are using figures of speech, that a volcano breathes out smoke; that the waves are angry; that a mountain lifts its head among the clouds; that the wind whistles; that the clouds threaten. With us, they are only figures of speech, but in the early days such expressions were more than that.

The ancient Greeks and the Romans lived in a region whose geological features could not be overlooked. There were mountains and mountain streams; there were volcanoes and earthquakes; there were chasms and rivers, deep, still lakes, and the restless, wind-tossed sea; and for all of those things the active minds of the Greeks and Romans had to find explanations. To those ancient peoples, everything was alive, not with merely human life, but with the life of gods. A man might blow a basin of water and make little waves upon it; what, then, more natural than that the wind, so like, on a large scale, the blowing out of a man's breath, should be the breath of some great god?

So they accounted for all the facts in nature which they saw about them. If they rose in the morning and found that the sea had become very stormy during the night and was hurling its great waves up on the shore, they felt that the sea god was angry, and they made offerings to him to buy back his favor. Anything so unusual as an earthquake or a volcanic eruption needed a very special explanation, so they invented histories that reached far back into the past, telling how the gods became angry with some huge giant and buried him under a mountain. His breath was the smoke of the volcano; his struggles to escape caused the earthquakes. A deep chasm or hole in the ground showed where some god had struck his spear, either in anger or because he wanted to get to the regions below the earth without taking a long way round. See MYTHOLOGY.

L.Laf.

### Contributions of Geology to Human Welfare

Geology, the earth science, after scarcely more than a full century of growth, is yet in the full vigor of its youth. During this time it has made free use of the discoveries and principles embodied in chemistry, physics, and biology, and in return has given liberally. Similarly, the geologist must draw freely from the other branches of natural science, whether his efforts are turned to research and scientific achievement, or, on the other hand, his work involves the finding and extraction of mineral resources. This fortunate interchange and mutual sharing of knowledge has given rise to

new studies, to new fields of science, and to new methods of exploration. Thus, the twentieth century has witnessed the birth of two new sciences, geophysics and geochemistry. That field of knowledge which is shared by the biologist and the geologist, namely, paleontology, the study of past life, needs no introduction here; however, detailed investigations along certain branches of this science have been of great importance in their practical use. It is in these three lines of endeavor—geophysics, geochemistry, and paleontology—that the greatest advances have been made.

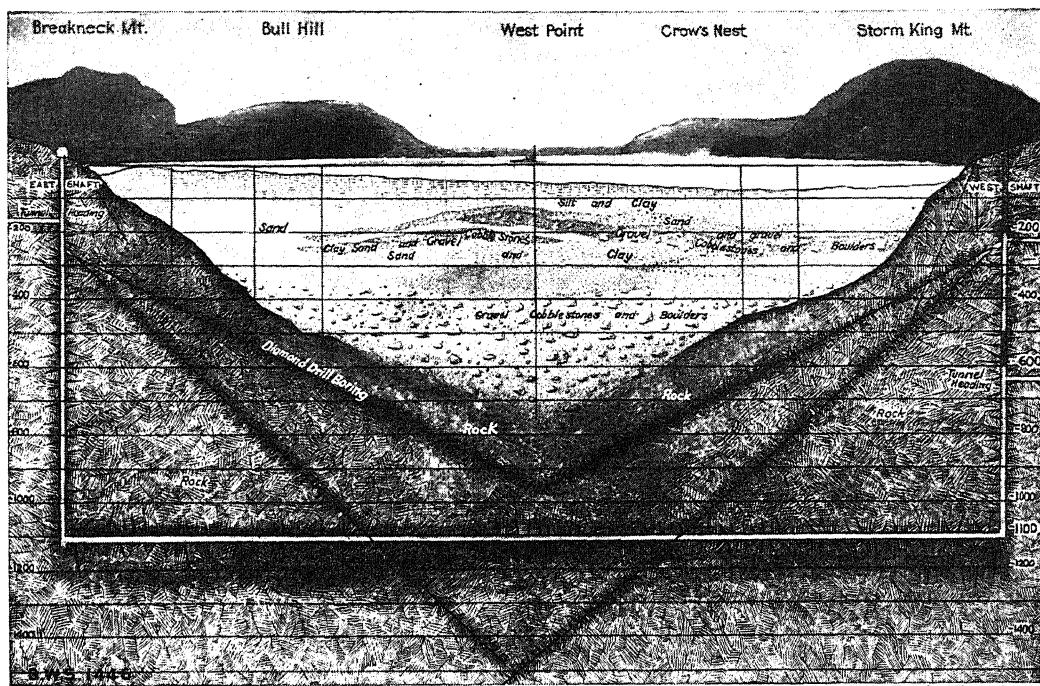


Photo: New York City Board of Water Supply

## THE STORM KING CROSSING OF THE CATSKILL AQUEDUCT

This composite shows the methods of exploring the gorge of the Hudson River at the northern gateway of the Highlands of Southeastern New York, where the aqueduct crosses the river, in a tunnel in granite, 1,100 feet below sea level, one of the most spectacular feats of tunneling ever attempted. On account of the difficulty and consequent delay in completing the borings, inclined borings were made from each side in order to prove the character of the rock.

Among the newer methods employed in exploration, three kinds of apparatus stand preëminent. These machines are constructed with the purpose of investigating differences in the nature of the rocks immediately below the surface of the earth; each represents an adaptation of well-known physical apparatus to the needs of the geologist. The torsion balance consists essentially of a pendulum so extremely sensitive that its deflection toward a denser mass underground may be observed and recorded. The seismograph makes a record of the different vibrations produced by detonating explosives underground. Differences in speed and size of vibrations point to differences in the kind of rock through which these artificial earthquake waves pass underground. Still other differences in the rocky shell of the earth are registered by delicate electrical apparatus, which measures the conductivity and resistance.

The methods briefly outlined above are employed largely in tropical countries, where the rocks are concealed beneath a thick layer of soil and vegetation. They have been developed for use in the search for oil, where other and more definite data are difficult to obtain. Electrical methods of exploration have been

employed in the quest for metallic mineral deposits.

Recent discoveries in the nature and behavior of matter and energy have found their way into the geologist's laboratory and have been adapted to his use. By measuring the speed at which the radioactive elements pass through their changes, the physicist and the geologist, working together, are able to estimate approximately the age of the very ancient rocks, if not the age of the earth itself.

A few years ago, it was discovered that the internal structure of minerals could be ascertained by means of X-ray photographs. Yet more recently, methods have been devised whereby minerals may be identified and compared by means of their X-ray photographs. In this way it is now possible to determine the composition of extremely fine particles—particles too small to be studied thoroughly under the microscope. This knowledge is of especial use to the industries which employ clay as their basis, particularly in the manufacture of ceramics and cement.

The sudden and world-wide search for oil, which followed the development of the automobile and similar machines, provided a great stimulus to the study of certain branches of



PLANTS LIKE THESE PRESENT-DAY CYCADS WERE COMMON IN JURASSIC TIMES

geology. Not only did it lead to the torsion balance, described above, but it also brought about a new and intense study of certain kinds of fossils. Petroleum is largely restricted to rocks which were formed in certain definite geologic periods. The age of oil-bearing rocks is principally determined by the kinds of fossils which they contain. Over vast areas, the only fossils found in sufficient abundance to be used were a little-known group called the *Foraminifera*. These had formerly escaped much attention, on account of their microscopic size. Their study has not only made possible the determination of the age of many rock formations whose place in nature was formerly obscure, but it has led to the discovery of new oil fields, and has aided in the revival of fields which once seemed to be exhausted. Furthermore, this study has prevented considerable losses which would result from drilling wells in unproductive regions.

In very recent years, geology has become more and more an applied science; it is no longer merely speculative. The knowledge of these truths and facts is so well known that it can be used to great advantage, not only in connection with mining of the metals and the finding of petroleum and coal, and other natural resources, but in engineering. For example, the behavior of the ground often

affects its competence in holding the waters of a reservoir, and knowledge of the conditions to be encountered is vital to the successful completion of the work. Nowadays, virtually no large piece of work in reservoir or tunnel construction is undertaken without the coöperation or advice of a geologist or a geological staff. Such precautions permit modification of design or method of construction, preventing extensive cost, unnecessary difficulty, or complete failure of the work. In every direction, therefore, the science of geology has been expanding, but perhaps its most marked advance in recent years has been its tendency to come into touch with progress in other fields.

In every branch of science, it happens that, after the fundamental basic principles have been established and accepted, the workers in that science turn their attention to more minute details and the collection of data necessary to unify and integrate the science as a whole. The assembling and organizing of geologic knowledge is at this time being greatly assisted by the various national councils and associations for the advancement of science, as well as by the national and state geological surveys. This new type of collaboration has led to the study of obscure problems by groups and committees working in coöperation rather than individually. Similarly, there is a modern

tendency to publish in the same volume the results achieved by different individuals, all working harmoniously on the same problem, and each using his own method of attack. The outstanding results achieved by this method have brought about a better understanding of the building up of mountain ranges and the collection and assimilation of facts pertaining to the origin of the sedimentary rocks.

Recent explorations in remote parts of the little known regions of the earth have added considerable information of value, not only to the science of geology, but also to the related sciences and to the general public. Thus, the expeditions to Central Asia have brought to light not only the strictly geological facts pertaining to earth history and structure in that region, but facts concerning the early history of man and the relatively rapid climatic changes which influenced his migrations and hastened his intellectual growth. Other expeditions of a more general nature have brought back geological data from Greenland and other remote parts of the earth.

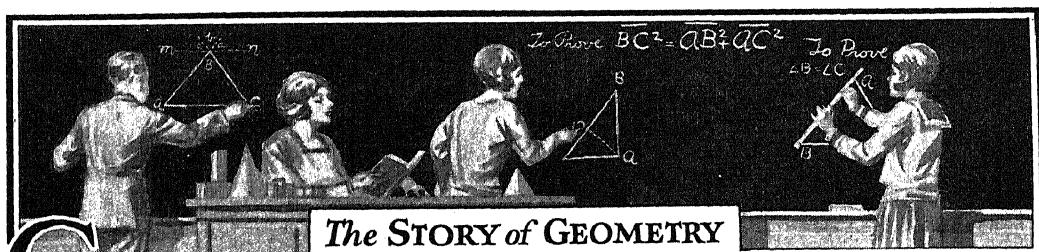
The average reader is likely to assume that the science of geology is quite fixed, the controversies of earlier times having been completely settled by this time. As a matter of fact, new ideas and new hypotheses concerning earth behavior and origin are constantly being presented, and some of them are quite antagonistic to formerly accepted views. For example, such ideas as the sliding of the continents and the making of mountains are attracting increasing attention, and the connection of all these matters with earthquake phenomena is bringing the whole story close to the practical life of many regions. C.P.B.

**Related Subjects.** In addition to the following articles, which bear directly upon geology in some of its phases, these volumes contain many articles which are more or less closely related to the general subject. For these the reader is referred to lists under GEOGRAPHY; METALS; MINERALS AND MINERALOGY; CHEMISTRY; GEMS.

|                      |                                |
|----------------------|--------------------------------|
| Basalt               | Loess                          |
| Bed                  | Magnetite                      |
| Boulder              | Mammoth                        |
| Butte                | Marble                         |
| Cambrian Period      | Marl                           |
| Carboniferous Period | Mastodon                       |
| Cave                 | Meerschaum                     |
| Cenozoic Era         | Mesozoic Era                   |
| Chalk                | Metamorphism                   |
| Clay                 | Mica Schist                    |
| Cleavage             | Miocene Epoch                  |
| Coal                 | Moraine                        |
| Conglomerate         | Nummulite                      |
| Cretaceous Period    | Obsidian                       |
| Crystalline Rocks    | Old Red Sandstone              |
| Devonian Period      | Oligocene Epoch                |
| Diabase              | Ordovician Period              |
| Dike                 | Orthoceras                     |
| Dinosauria           | Paleontology                   |
| Dip                  | Paleozoic Era                  |
| Dolomite             | Permian Epoch                  |
| Drift                | Pliocene Epoch                 |
| Emery                | Porphyry                       |
| Eocene Epoch         | Proterozoic Era                |
| Erosion              | Pterodactyl                    |
| Evolution            | Pumice                         |
| Fault                | Quaternary Period              |
| Fossil               | Quicksand                      |
| Fulgarite            | Rock                           |
| Fuller's Earth       | Sand                           |
| Geological Surveys   | Sandstone                      |
| Glacial Epoch        | Sedimentary Rocks              |
| Glyptodon            | Serpentine                     |
| Gneiss               | Shale                          |
| Granite              | Silica                         |
| Graphite             | Silurian Period                |
| Gypsum               | Slate                          |
| Hematite             | Soil                           |
| Hornblende           | Stalactites and<br>Stalagmites |
| Human Epoch          | Steatite                       |
| Ichthyosaurus        | Stratified Rocks               |
| Igneous Rocks        | Tertiary Period                |
| Iguanodon            | Trachyte                       |
| Joints               | Travertine                     |
| Jurassic Period      | Triassic Period                |
| Kaolin               | Tripoli                        |
| Limestone            | Tufa                           |
| Limonite             | Vein                           |
| Loam                 |                                |

#### GEOLOGISTS

Dana, James Dwight      Lyell, Sir Charles  
Dawson (Family)      Muir, John  
Geikie, Sir Archibald      Powell, John Wesley  
Heilprin, Angelo      Shaler, Nathaniel S.  
Le Conte, Joseph      Tyndall, John  
Winchell, Alexander



**G**EOMETRY. A great city had fallen, and soldiers were rushing through its streets, putting to death all who gave them the slightest excuse. One burly soldier rushed into the study of an old man whose ears seemed deaf to the tumult around him, and who seemed to

see nothing but the figures he was tracing with his finger in sand. The soldier stopped, wondering whether these might perhaps be magic figures, and as his shadow fell upon the markings, the old man looked up. "Don't touch my circles!" he cried; but the soldier,

angered at the commanding tone, ran him through the body with his sword. The general in command grieved over the death of this old man, took upon himself the support of his relatives, and erected in his honor a stately tomb. He did this despite the fact that the old man had done all in his power against the invaders, in aiding in the defense of the city; for in such reverence did the ancients hold learning, and especially the marvelous science of circles and angles and spheres, which is called *geometry*, or *earth-measuring*.

The sacked city was Syracuse, in Sicily, which fell before the Romans in 212 B.C.; the drawer of the mystic figures was Archimedes, one of the greatest mathematicians of antiquity (see ARCHIMEDES). Thus runs one of several accounts of his death. (See page 358.)

**The Story of Geometry.** Geometry is not like that simpler form of mathematics which we call arithmetic—a comparatively modern science; the former existed in a fairly complete form two thousand years ago. It is probably true that geometry had its beginnings in practical problems. The ancient Egyptians, for instance, had great difficulty in preserving boundary lines between the fields which each year were flooded by the Nile, and when the waters subsided they had to make new surveys or “land-measures”—hence the name *geometry*. Now, in making these surveys, it was very necessary that they know how to mark off correctly right angles. The Egyptians had never heard the rule which every student of arithmetic learns—that the square of the hypotenuse of a right-angled triangle is equal to the sum of the squares of the other two sides; but they had worked out, no one knows how, the fact that if they measured off with their ropes a three-sided figure whose sides were in the relation of 3, 4, 5, the large enclosed angle would be a right angle.

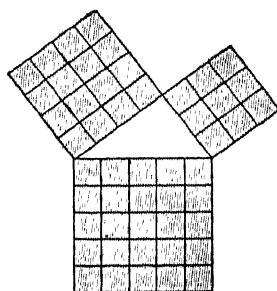
In their plans for the pyramids, too, the Egyptians must have made use of many of the principles with which geometry concerns itself, but it cannot be said that they ever really developed a science of geometry. This was left for the Greeks to do. Thales was the first Greek to make a systematic study of the subject, but more famous than he was his disciple Pythagoras (which see), who worked out that proposition about right-angled triangles

which the Egyptians had felt after blindly, and which is still called for him the *Pythagorean Theorem*. Philosophers found this new subject quite to their taste, and Plato and Aristotle contributed much to its development; but it was left for Euclid, a Greek of Alexandria who lived about 300 B.C., to organize everything that his predecessors had discovered (see EUCLID). He added new problems, and set forth all his knowledge in his *Elements*, a book on which the teaching of geometry has ever since been based. Indeed, his name is practically a synonym for *geometry*. “To-morrow’s Euclid is hard,” says the English schoolboy, and no one misunderstands him.

The next really great geometrician was Archimedes, who died, as related above, in 212 B.C. He had left a request, which was faithfully carried out, that there be cut on his tomb a sphere inscribed in a cylinder, because the working out of that problem he felt was his greatest achievement. All through the Middle Ages, there was little interest in geometry, and though this was awakened at the time of the Renaissance, no real advance was made in the science until within the last three centuries. It is useless to discuss in such an article as this these more recent developments, as they all relate to the more abstruse phases of the subject. Suffice it to say that the problems over which the schoolboy nowadays puzzles his brain are the very problems which interested Euclid.

**What Geometry Concerns Itself With.** The foregoing discussion of the way in which geometry has developed does not really tell what it is. Perhaps the simplest definition is to say that geometry is the “science of space,” that is, it concerns itself with the relations and properties of *points*, which have position but not magnitude; *lines*, which have but one dimension, length; *surfaces*, which have two dimensions, length and breadth; and *solids*, which have three dimensions, length, breadth, and thickness. This may sound at first rather theoretical, but geometry is an eminently practical subject. If a man wishes to bisect (cut in two equal parts) a given line or a given angle; to inscribe one figure in another; to drop a perpendicular to a line from a point without the line; to draw a line parallel to a given line through a given point; to make an angle equal to a given angle—to do any of these or a thousand other things which not only the architect, the stonemason, or the draftsman, but the carpenter or the amateur craftsman may be called upon to do at any time, only geometry can help him to perform his task simply and accurately. Indeed, many of the problems which geometry has solved have grown out of just such popular needs.

**Branches of Geometry.** The geometry taught in secondary schools is called *elementary*, no



PYTHAGOREAN THEOREM

A figure which shows that the square drawn upon the hypotenuse of a right-angled triangle is equal to the sum of like squares drawn upon the other two sides.

matter how difficult and "advanced" it may seem to the student who is becoming acquainted with it for the first time; and elementary geometry is divided into two branches—*plane geometry* and *solid geometry*. Plane geometry treats of figures which lie in a plane—that is, which have not more than the two dimensions of length and breadth, and have no part of their surface curved; while solid geometry treats of simple solids, or objects having the three dimensions of length, breadth, and thickness, such as cylinders, cubes, spheres, or cones. With any other curve than that of the circle, or with plane surfaces or solids bounded by any other curves, elementary geometry has nothing to do.

The geometry to which the ancients who built up the science devoted themselves did not go very far beyond this elementary stage, but modern mathematicians have made many advances in various directions. Among these, the subject of *analytic geometry* deserves mention in a work of this sort.

Analytic geometry is a combination of geometry and algebra; or, rather, it is a method for studying geometry by means of algebra. The relations of geometric figures are expressed in algebraic terms, equations are formed and worked out just as in algebra, and the resultant equation is translated back into geometric figures. This makes possible the study of more complex curves than elementary geometry can deal with. First of all, the properties of conic sections may be more easily understood by means of this algebra-geometry process. If a cone be cut by a plane parallel with its base, the cut surface is a circle, but if cut in any other way, except from top to bottom, the resulting curve is less simple; and these less simple curves, or conic sections, as they are called, are favorite subjects of analytic geometry. Spirals, too, and wavy lines cannot conceal their properties and their relations from the person who has mastered this higher form of geometry. The problems worked out are all too difficult for solution here, but it is interesting for even the beginner to know that such an all-embracing form of geometry does exist.

**Terms Used.** The student beginning elementary geometry finds himself brought face to face with many new and strange terms. In algebra, as in arithmetic, the things he was called on to solve were called problems. Here he hears talk of *propositions* and *theorems*, *corollaries*, *axioms*, and *hypotheses*, or sees at the bottom of a solved "problem" the mysterious letters *Q. E. D.* or *Q. E. F.* A few definitions, however, will make all of these plain:

A *proposition* is the statement of some truth that is to be proved, or of some operation that is to be performed. A proposition of the former type, which states some truth that may

be logically demonstrated, is a *theorem*; one of the latter type, which proposes a question for solution, is a *problem*. Thus, "The sum of the three angles of a triangle is equal to two right angles," and "Construct a square equivalent to the sum of two given squares," are both propositions, but the former is a theorem, the latter a problem.

A *corollary* is a truth easily deduced from one or more propositions already proved. Thus, if it is true that the sum of the three angles of a triangle is equal to two right angles, it follows as a self-evident corollary that a triangle can have but one right angle or one obtuse angle.

A *demonstration* is the proof of a theorem; a *solution* is the process of solving a problem.

The *hypothesis* is the "if" part of a proposition—the part which states the thing or things taken for granted; the *conclusion* sets forth the things which are to be proved true. In the proposition "*If two sides of a quadrilateral are equal and parallel, the figure is a parallelogram*," the part in italics is the hypothesis, the rest the conclusion.

*Q. E. D.* is the abbreviation for the Latin words *Quod erat demonstrandum*, meaning "which was to be proved," and is placed at the close of the *demonstration* of every satisfactorily proved theorem.

*Q. E. F.* means *Quod erat faciendum*, or "which was to be done," and is placed at the close of the *solution* of any geometric problem.

One of the terms used very frequently in geometry is *axiom*, which means a *self-evident truth*. Geometry seeks to prove most things about the properties and relations of lines, surfaces, and solids; it takes a few for granted, calling them true in the very nature of things. Who, for instance, would think of questioning the statement that "Things equal to the same thing are equal to each other"? That is an axiom, and there are many others, of which the following are perhaps most important:

- (1) If equals be added to equals, the results will be equals.
- (2) If equals be taken from equals, the remainders will be equal.
- (3) The doubles of equals are equal.
- (4) The halves of equals are equal.
- (5) The whole is greater than any of its parts.
- (6) The whole is equal to the sum of all its parts.

Then there are *postulates*—propositions taken for granted, without proof—and these, like the axioms, were set forth by Euclid and have helped to form the basis of geometric reasoning ever since. Some of the more important ones are as follows:

- (1) Any magnitude can be bisected.
- (2) A straight line can be continued indefinitely in either direction.
- (3) A circle can be drawn with any radius, and from any point as center.

(4) Between two points only one straight line can be drawn.

(5) A straight line is the shortest distance between two points.

**How Geometry Proves Things.** Given a theorem to be proved, geometry goes about it in a very definite way. In the first place, nothing must be assumed. There must be proper authority for every step in the process; and proper authority lies only in an axiom, a postulate, a definition, or a proposition already proved. But not all theorems are proved in exactly the same way; there is a *direct* and an *indirect* method. The former consists either in superimposing one figure upon another, or in starting out with some unquestionable fact and proceeding step by step by means of axioms, postulates, or theorems already proved, to a conclusion which *must* be correct because every step in it has been taken with full authority. The following is a direct proof:

If two parallels are cut by a transversal, the alternate interior angles are equal.

*Hypothesis:* AB and CD are parallel lines, cut by the transversal EF.

*Conclusion:* Angle  $x = \text{angle } y$ .

*Proof.* Through M, the middle point of EF, draw HK perpendicular to AB.

HK is also perpendicular to CD. (It has been proved that "a straight line perpendicular to one of two parallels is perpendicular to the other.")

Apply the figure MKF to the figure MHF so that the equal vertical angles at M shall coincide, MK falling along MH, and MF along ME. (It has been proved that all vertical angles are equal.)

Then F will fall on E,

for MF equals ME by construction;

and FK will fall along HE,

for FK and EH are both perpendicular to HK. (A previous theorem has proved that "from a point without a line, only one perpendicular can be drawn to the line.")

Therefore the angles  $x$  and  $y$  coincide and are equal, for by definition "the test of equality of any two magnitudes is that they can be made to coincide." Q.E.D.

In an indirect proof, something is assumed as true, and known truths and demonstrated propositions are built upon it until it is shown that if the original assumption be not true the result is an absurdity—a self-evident falsity. This method is known as the *reductio ad absurdum*, or *reduction to an absurdity*. The following demonstration gives a very simple example of this interesting method:

Two straight lines in the same plane, perpendicular to the same straight line, are parallel.

*Hypothesis:* AB and CD are two lines perpendicular to the line EF.

*Conclusion:* AB and CD are parallel.

*Proof.* Could AB and CD, if produced far enough, meet at some point, as  $x$ , there would be two perpen-

diculars drawn from the point  $x$  to the line EF. But this is impossible, for it has been proved that "from a point without a line only one perpendicular can be drawn to the line."

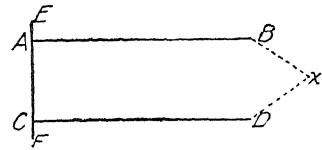
Therefore AB and CD cannot meet.

Therefore AB and CD are parallel.

For by definition,

"lines in the same plane which cannot meet, however far produced, are parallel."

Q.E.D.



It will be evident from these two examples that the order in which theorems are to be demonstrated is fairly well determined, for each demonstration must make use of only what has been proved before—it cannot reach forward to what is to come. In plane geometry, the simplest form and therefore the most interesting to most students, there are about 130 important propositions, but there are many minor propositions which are no less interesting, and many which are difficult to prove, no matter how simple they may appear to be.

**Some Famous Theorems.** There are some theorems which are particularly famous, either because of some special difficulty, some neatness in the demonstration, or some historical interest. There is the *pons asinorum*, for instance, or "asses' bridge." From time immemorial, it seems, dull scholars have found difficulty with this proposition, which Euclid made the fifth in the first book of his *Elements*. Here it is, with its proof:

In an isosceles triangle, the angles opposite the equal sides are equal.

*Hypothesis:* ABC is an isosceles triangle, having AB equal to AC.

*Conclusion:* Angle B = angle C.

*Proof.* Draw AD bisecting the base BC.

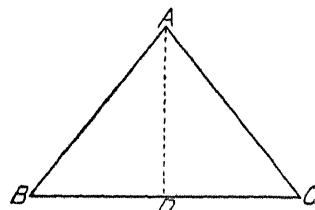
The triangles ADB and ADC are equal;

for AD = AD, by identity, DB = DC, by construction, and AB = AC, by hypothesis;

and it has been proved that "two triangles are equal if the three sides of one are equal respectively to the three sides of the other."

Therefore angle B = angle C, for it has been proved that "corresponding angles of equal triangles are equal."

Q.E.D.



Then there is the so-called Pythagorean Theorem, one of the most practical and useful of all the propositions of geometry—"The square of the hypotenuse of a right-angled triangle is equal to the sum of the squares of the other two sides." Simple enough it seems, when all the necessary preliminaries

are proved, but its demonstration, with that of its necessary preliminaries, is one of the surest proofs that the ancient Pythagoras was a brilliant reasoner.

*Hypothesis:* BC is the hypotenuse of the right triangle BAC.

*Conclusion:*  $\overline{BC}^2 = \overline{AB}^2 + \overline{AC}^2$ .

*Proof.* Draw AD perpendicular to BC.

Then  $\overline{AB}^2 = BC \times BD$

and  $\overline{AC}^2 = BC \times DC$  (for it has been

proved that "if in a right triangle an altitude is drawn to the hypotenuse, each leg of the triangle is a mean proportional between the hypotenuse and the adjacent segment").

Adding,  $\overline{AB}^2 + \overline{AC}^2 = BC(BD + DC)$  or  $= \overline{BC}^2$  (for by axiom, "if equals be added to equals, the results are equals"). Q.E.D.

Another theorem which lies at the basis of many propositions in geometry, and which is also credited to Pythagoras, is the one which declares that:

The sum of the three angles of a triangle is equal to two right angles.

*Hypothesis:* ABC is any triangle.

*Conclusion:* Angle A + angle B + angle C = two right angles.

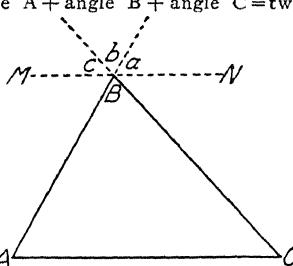
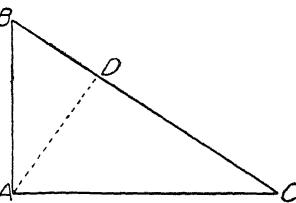
*Proof.* Draw MN through B parallel to AC, and produce AB and CB, forming angles a, b, and c.

Then angle A = angle a, being corresponding angles of parallel lines, which have been proven equal; and B = angle b, being vertical angles, which have been proven equal;

and angle C = angle c, corresponding angles of parallel lines.

Adding, angle A + angle B + angle C = angle a + angle b + angle c (for by axiom "if equals be added to equals, the results are equal").

But angle a + angle b + angle c = two right angles, for "the sum of all the angles that can be found at a point in a straight line and on the same side of the line, is equal to two right angles."



It is impossible to list here all the theorems which are especially interesting; indeed, the interest is not fully apparent when they are inspected in this disjointed manner. Only as the student follows logically from one theorem to the next can he feel the full joy that geometry has to give.

**Why Geometry Is Studied in School.** Geometry is usually accepted without question as

one of the important subjects in a secondary school course. Few arguments have to be made for it, so apparent is its value. First of all, it lies at the basis of the whole science of measurement. To be sure, now that the theorems and problems have been fully worked out, the results have been in a measure passed on to arithmetic and are there stated as rules, so that a person may figure out the amount of carpet needed for a certain floor, the cubic capacity of a wheat bin or of a hogshead, the height of a tree, or many of the other practical problems without knowing the fundamental principles of geometry on which these problems are based. However, knowledge of geometry enables him to apply his rules far more intelligently, as well as to work out new applications for himself in the realm of higher mathematics. Geometry is intermediate between algebra and the higher subject of trigonometry (which see).

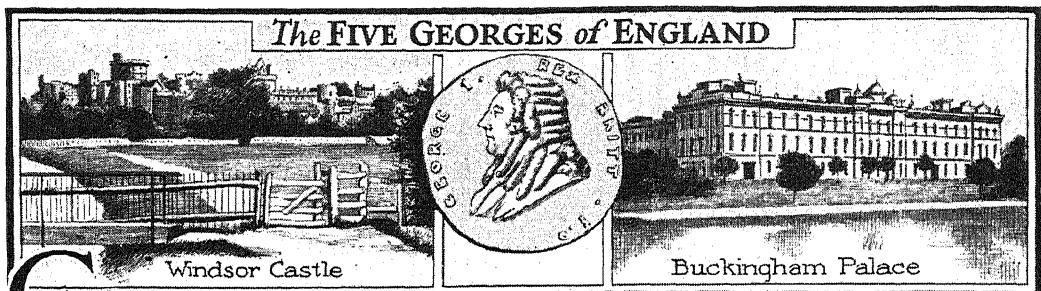
But geometry has other values, as important if not so practical. Its logical plan, the way it proceeds from step to step without allowing for any gap in the reasoning, develops the reasoning powers in a way impossible to any subject which admits of more hit-or-miss methods. Nor are all the theorems and problems of geometry worked out and set down in the textbooks for the student to study. Any good book contains a large number of original propositions which the student must work out for himself, and nothing proves more clearly his mastery not only of geometric principles but of the workings of his own mind, than the ability to work out a theorem clearly and with the fewest possible statements make his demonstration clear to others. There is a joy which must be felt to be appreciated in detecting a fallacy or a gap in the reasoning, or in tracing out the definition, axiom, or proposition which makes it plain that some elusive point is actually provable. This is less true if one dislikes mathematics.

To sum up, no study can quite take the place of geometry as a cure for slovenly habits of thinking, and until some such substitute can be found, it seems likely to hold its place, even for those who have no practical use for its teachings.

J.W.Y.

**Related Subjects.** In addition to the topics referred to in the foregoing discussion, there are in these volumes many articles which are more or less closely connected with geometry. The reader is referred to the following:

|             |                |
|-------------|----------------|
| Angle       | Plane          |
| Area        | Polygon        |
| Axiom       | Prism          |
| Circle      | Pyramid        |
| Cone        | Quadrilateral  |
| Cube        | Rectangle      |
| Curve       | Rhombus        |
| Cylinder    | Sphere         |
| Degree      | Spheroid       |
| Ellipse     | Square         |
| Line        | Square Measure |
| Mensuration | Triangle       |



**G**EORGE, the name of five kings of England, of the House of Hanover. The early Georges were unpopular because they were more German than English, but the latest bearer of the name (George V) was born an Englishman, and he won the respect and affection of the English people.

George I (1660-1727) came to the English throne on the death of Queen Anne in 1714. He was a great-grandson of James I of England, but his father was elector of Hanover and he had been born and brought up in Germany. In 1698 he succeeded his father as elector, and three years later was declared heir to the British crown. No opposition was made to his accession, but his utter lack of sympathy with Eng-

lands; indeed, he preferred to spend his time among his old friends in Hanover rather than in his island kingdom. The chief event of his reign was the bursting of the "South Sea Bubble," and it was not the king, but Walpole, who saved England in that crisis.

George II (1683-1760) was the son and successor of George I. He, too, was born in Hanover, and was



Photo: Brown Bros.  
GEORGE I



Photo: Brown Bros.  
GEORGE II

land's traditions and ideals, as well as his loose morals, prevented any personal affection for him in Britain, while in the government he did not pretend to exercise much influence. As he could not understand English, he did not attend the Cabinet meet-

thirty-one years old at the time of his father's accession to the English throne. Thus he was almost as German in his sympathies as was his father. In 1708, while he was electoral prince of Hanover, he fought with distinguished gallantry under the Duke

of Marlborough, and in 1727 came to the throne as king of Great Britain and Ireland. Walpole and Pitt were among the men who guided the nation during the reign of this second George. To his credit it may be said that, despite his obstinacy, he was always willing to follow his ministers' advice if he could be convinced of its wisdom. Great colonial expansion marked George's reign: Clive laid the foundations of a vast empire in India; and Wolfe, by his victory on the Heights of Abraham, ended French control in North America and gave Canada to Britain.

**George III (1738-1820).** The reign of this third George is of peculiar interest to Americans, for at its beginning, the thirteen English colonies in America were still possessions of England, discontented at times, but on the whole loyal; while at its close, they had become a prosperous and independent nation which had twice held its own against the mother country in war. George III succeeded his grandfather, George II, in 1760, and proved in some ways very different from his predecessors. He was a man of high moral character, and his home life with his wife, Charlotte Sophia of Mecklenburg, was most happy. George had no intention of giving over the government to ministers—he wished to be the real ruler, though not in the absolute manner of the old Stuart kings. He tried minister after minister, but not until North was put in charge of affairs in 1770, did he find one exactly to his liking. For the twelve years that North was in office, the king practically dictated the national policies, and it was largely his determined attitude toward the colonies that brought on the American Revolution. During the ministry



GEORGE III

of Pitt, the war against France, which grew out of the excesses of the French Revolution, was vigorously prosecuted.

More than once during his long reign, the king suffered from mental derangement, and in 1811 he

became hopelessly insane. The Prince of Wales governed as regent, and on the death of his father in 1820, became king as George IV.

**George IV (1762-1830).** While he was yet Prince of Wales, his immoral life, his unfilial conduct, and



Photo: Brown Bros.

GEORGE IV

his repeated attempts to divorce his wife, the Princess Caroline Amelia of Brunswick, had almost broken his father's heart and had lost him the respect of the people; but through it all he bore the proud title of "the first gentleman of Europe," because of his gallant manner, his cleverness, and his exquisite dress. In the important events of his reign, which included the Napoleonic wars and the passing of the Catholic Emancipation Act, he had little part. He left no descendants, and his brother, William IV, succeeded him.

**George V (1865- ).** Since 1926, when the great dominions were given a status equal to that of the mother country, George V has borne the title of "George V, by the Grace of God, of Great Britain, Ireland, and the British Dominions beyond the Seas, King, Defender of the Faith, Emperor of India." He was born June 3, 1865, and was the second son of Edward VII, but on the death of his elder brother, in 1892, became heir to the throne. Meanwhile, he had received a thorough training in the navy, starting at the age of twelve as cadet and enduring the same discipline as his shipmates. In 1893 he became captain, in 1901 rear admiral, and in 1903 vice admiral, though after 1892 he was not in active service. He was married in 1893 to the Princess Victoria Mary of Teck, who has borne him six children, the eldest of whom, Edward, Prince of Wales, was born in 1894.

After his father's accession in 1901, George made a tour of the world, chiefly to acquaint himself with conditions in the British colonies, and on his return was associated with his father in governmental affairs. At Edward's death in 1910, he became king, the coronation taking place June 22, 1911. The greatest event of his reign, one which tested to the utmost



GEORGE V

Photo: Brown Bros.

the stability of the British nation, was the World War. England's first Labor government held the reins of power for nearly a year in 1923, but it manifested no gesture of disapproval of the royal house. Unlike his father, King George during his early life was of a quiet, retiring nature, caring little for social affairs, and his people knew little of him at his accession. His popularity, however, was immediate and lasting. In the winter of 1928-1929, the king's life was endangered through a protracted illness, and recovery was very slow.

**The Family Name of Wettin.** The family of the reigning house of Great Britain can be traced back with certainty to the year 982, when the Wettins, whose name was derived from a castle on the Saale River, were first represented by Dietrich, who was Count of Hassegau, a district bordering the river. His descendants increased the realm until in the time of Conrad I, in 1048, it covered a good part of what is now Central Germany. In 1423 the Duchy of Saxe-Wittenberg fell to Frederick, a member of the Wettin family, and in the middle of the fifteenth century, the district of Coburg fell to the possession of the family. In time, Saxony was added, and its first king was Frederick Augustus I, who had a long and eventful reign.

Gotha came into the possession of the family on the extinction of the succession of the landgraves of Thuringia. Succeeding rulers of the family had an

important part in building the kingdoms which later became the German Empire. The line had become known as the House of Saxe-Coburg-Gotha. A member of this house, Albert, Prince of Saxe-Coburg-Gotha, was chosen in 1840 by Queen Victoria of England as her husband, and by that union the ancient family of Wettin was merged with the English royal house. Victoria's son Edward VII is listed as of the House of Saxe-Coburg-Gotha, as was his son George V on his accession. The World War led the English sovereign to sever all ties, even in name, connecting the dynasty with Germany, and on July 17, 1917, the royal family became officially the House of Windsor.

**Related Subjects.** The following articles in these volumes contain much information as to the history of the period of the Georges:

|                                 |                     |
|---------------------------------|---------------------|
| Clive, Robert                   | South Sea Company   |
| French and Indian Wars          | Walpole, Sir Robert |
| Great Britain (History)         | Windsor, House and  |
| North, Frederick, Lord          | Family of           |
| Pitt, William                   | Wolfe, James        |
| Revolutionary War in<br>America |                     |

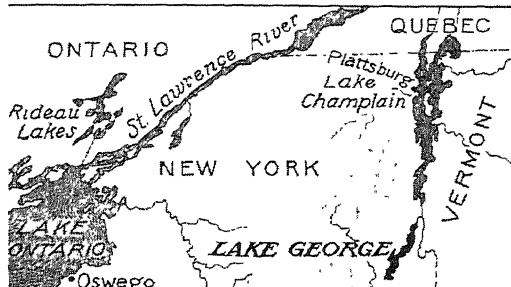
**GEORGE, DAVID LLOYD.** See LLOYD  
**GEORGE, DAVID.**

**GEORGE, HENRY** (1839-1897), author of the economic theory of the single tax (which see), and one of the few Americans who have made notable contributions to economic science. The underlying doctrine of the single tax, that all men have equal right to the use of land, just as they have of air and sunlight, is not original with George, but he made the first clear statement of a method by which this right could be enforced without increasing "the machinery of government.

From his fourteenth year, George worked to support himself, and to the end of his life was a poor man. He shipped as a foremast boy on a vessel bound for Australia, hunted gold in British Columbia, learned the printer's trade in California, and finally became a newspaper reporter and editor in San Francisco. As he matured, he began to meditate on the economic conditions he saw about him, on the riches acquired suddenly by the fortunate owners of gold-bearing lands. It was here that he first realized that the individual landowner is seldom, if ever, responsible for the increase in the value of his property. His theories were first stated in a pamphlet, *Our Land Policy*, published in 1871. A more complete statement is found in his famous book, *Progress and Poverty*, published in 1879.

This book made George the prophet of a new social and economic creed, and the remainder of his life was devoted to lecturing and writing on the land question and other economic and political subjects. While not politically ambitious, he twice accepted an independent nomination for mayor of New York City, which was his home after 1883. He was defeated the first time, and died during his second campaign for this office. See SINGLE TAX.

**GEORGE, LAKE**, located in the eastern part of the state of New York, has figured historically in two wars, and was in turn under the control of the French, the English, and the



LOCATION MAP

colonists during the early history of America. It has a length of thirty-six miles and a varying width of from one to three miles, and forms part of the boundary between Warren and Washington counties. This is one of the most picturesque lakes in the world, and is a favorite summer resort. Its waters discharge into Lake Champlain.

**Historical.** During the French and Indian and Revolutionary wars, the vicinity of Lake George was a notable battleground. Forts were built at Ticonderoga by the French, and at the head of the lake by the English. The Battle of Lake George was fought on September 8, 1755, between the French and the Indians. A monument was unveiled to mark the spot on September 8, 1903, the state of New York having purchased the land now known as Battle Park Reservation. Cooper, the novelist, called the lake Horicon, but the name was changed by General William Johnson in August, 1755, and that of Lake George was given, in honor of the English king, George III. See **TICONDEROGA, BATTLES OF**.

**GEORGE, SAINT**, the patron saint of England. His life is surrounded by legends, and little is definitely known of him. Most accounts state that he was of Cappadocian parentage, but born in Lydia. He became a soldier and rose to high rank under Diocletian, but his open profession of Christianity led to his arrest, and after suffering cruel tortures, he was put to death at Nicomedia, April 23, A.D. 303. Saint George was highly venerated by the Crusaders, and in 1350 was proclaimed the patron saint of England. The red cross of Saint George on a white background was long worn as a badge by English soldiers, and is retained in the Union Jack (see **FLAG**). The familiar legend of Saint George and the Dragon arose from confusion of the saint with Perseus, the pagan hero who slew the sea monster that threatened Andromeda (see **PERSEUS**). Saint George is also the patron saint of Russia and Portugal. In many

European countries, though not regarded as a patron saint, George is venerated and has been made the tutelary saint of many orders. See **SAIN'T GEORGE AND THE DRAGON**.

In the United States, there is a fraternal and benevolent order styled *Sons of Saint George*, with branches in most large cities. The object of this nonpolitical association is to further social intercourse and to assist those of English descent in America.

**GEORGE, WILLIAM R.** See **CHARACTER TRAINING (Unselfishness Is Fundamental); GEORGE JUNIOR REPUBLIC**.

**GEORGE ELIOT.** See **ELIOT, GEORGE**.

**GEORGE I** (1845-1913), king of Greece from 1863 to 1913, was the second son of Christian IX of Denmark, and a brother of former Dowager Queen Alexandra of England. In 1862 the Greeks deposed their ruler, King Otto, and the following year the national Parliament elected to the kingship the Danish prince, who was then called William. Having gained the consent of his family and of Great Britain, France, and Russia, under whose protection the kingdom had been established, Prince William ascended the throne in 1863 as George I. Four years later he married Princess Olga, daughter of the Russian Grand Duke Constantine. On March 18, 1913, just fifty years after he ascended the throne, King George was assassinated by a lunatic, during the Balkan Wars (see **BALKAN WARS**). He was succeeded by his eldest son, Constantine, Duke of Sparta. See **CONSTANTINE I; GREECE (History)**.

**GEORGE JUNIOR REPUBLIC**, a miniature republic in which boys and girls are the citizens and fill the offices, and in which some special duty is expected of every member. It has a constitution modeled on that of the United States, calling for an executive department, a legislature of two houses, and a judicial department. This interesting community is near Freeville, N. Y., and was organized in 1895 by William R. George for the purpose of giving to poor and unfortunate and even apparently incorrigible children the chance to grow into useful men and women. For a year Mr. George was president, but since 1896 all offices have been held by the boys and girls.

Children aged twelve to eighteen from any part of the United States may be enrolled as citizens. All, no matter how young, must work, and all under the age of sixteen must attend the school of the community. An attempt is made to encourage those who have a desire for further education to go on through high school and college. For those for whom scholastic training holds no charms, however, there is a choice among numerous vocations. A boy may take up carpentry, blacksmithing, farming, plumbing, or printing, while for the girls there is training in sewing, cooking, laundry work, and other branches. In ad-

dition to the cottages in which the citizens live, the community has its schoolhouse, its bank, store, library, government building, restaurants, and workshops.

Junior republics have been founded elsewhere, but criticism as to the methods employed has by no means been lacking. By 1913 complaints against the Freeville institution became so persistent that the State Board of Charities took the matter in hand, and Mr. George gave up his position as overseer. The republic practically ceased to exist until a number of interested men subscribed a new endowment fund, and requested Mr. George to assume control, with the result that a new era of prosperity began for the community.

#### GEORGE PEABODY COLLEGE FOR TEACHERS.

See PEABODY EDUCATION FUND.

**GEORGETOWN**, capital of British Guiana. See BRITISH GUIANA (Cities).

**GEORGETOWN UNIVERSITY**, a Jesuit educational institution at Georgetown, D. C. (now a part of Washington), was founded in 1789, and in 1815 was given authority by Con-

gress to confer degrees. Since 1833 it has had Papal consent to give degrees in philosophy and Catholic theology. The university maintains a college, a graduate school, a medical and dental school, a law school, and an astronomical observatory.

**GEORGE WASHINGTON UNIVERSITY**, an institution of higher education located at Washington, D. C., the successor of the Columbian College of the District of Columbia, which was chartered by Congress in 1821. In 1873 the name was changed to the Columbian University, and in 1904, by act of Congress, the school became the George Washington University. The old Columbian College was under the control of the Baptist Church, but when the present name was adopted, the institution was made non-denominational.

The university embraces the college of arts and sciences, school of graduate studies, Columbian College, for undergraduates, college of engineering and mechanic arts, teachers' college, the departments of law, medicine, and dentistry, and the associate colleges of pharmacy and veterinary medicine.



**G**EORGIA, *jor' ji ah*, or *jor' jah*, a South Atlantic state, whose slogan for many years has been "Cotton is King." To-day, corn is crowding cotton for a place on the throne; and manufacturing, under the impetus of super-power developments, threatens to establish a rival dynasty. In the year 1928, for the first time, the total manufactured products exceeded in yearly value the total agricultural products of the state.

Following the War of Secession, Georgia experienced a long period of demoralization. Homes and business were destroyed, and farming was almost the only activity. In the attempt to restore an economic balance, little thought could be spared for educational, cultural, or political progress. But in the first quarter of the present century came an agricultural revolution; cotton, which in 1900 had been three-fourths of the total crop, within twenty-five years was less than a third of an agricultural turnover three times the size of that in 1900. Bondage to the idea that Georgia could grow cotton and nothing else had been broken; and with the new agricultural freedom came impetus to progress along other lines. Georgia was awake, ready to show sister states

that once again it claimed the title of EMPIRE STATE OF THE SOUTH.

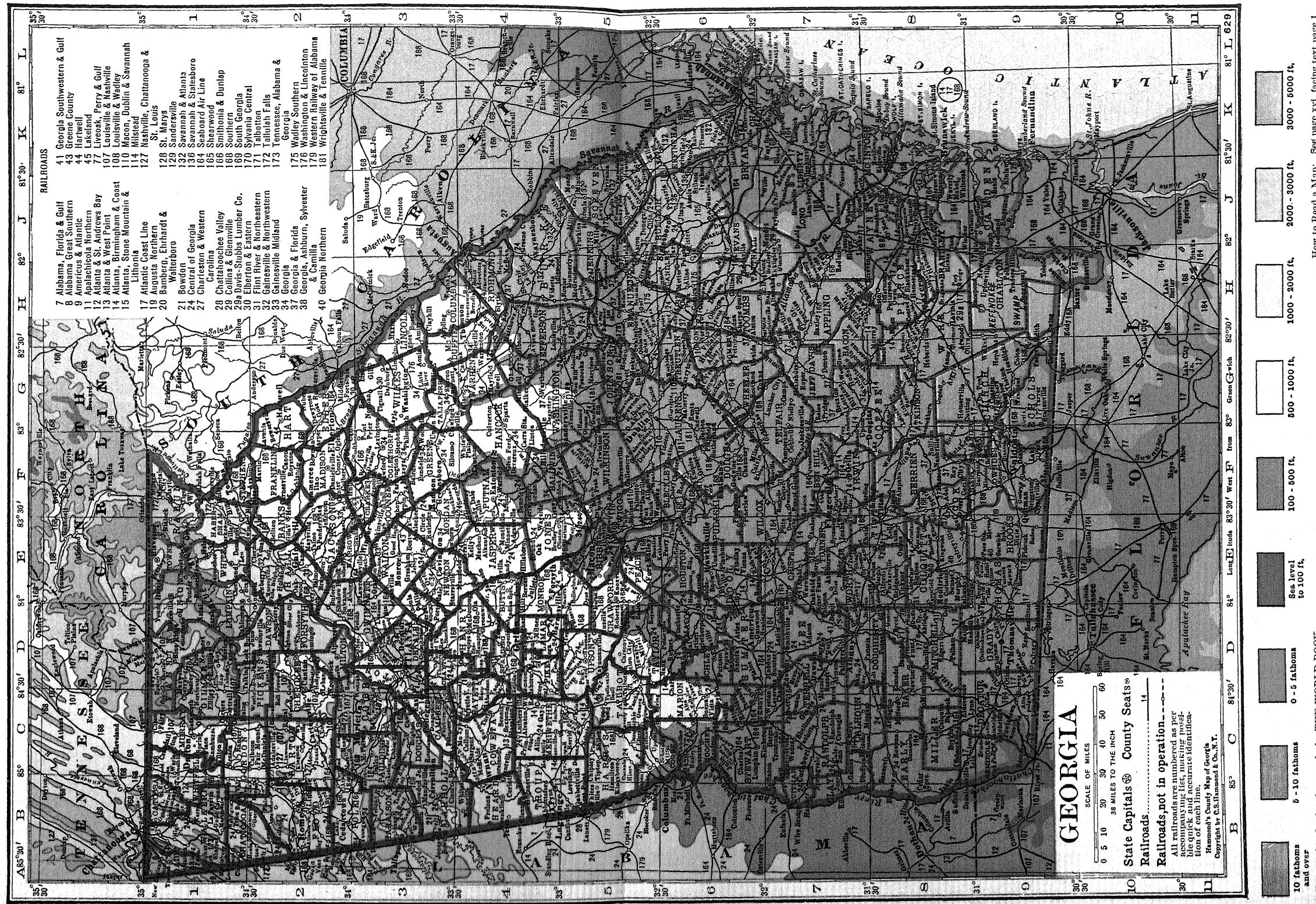
**Legend of the State Flower.** We are told that long ago a Cherokee Indian maiden loved a brave of the Seminole tribe. She loved him so well that she agreed to leave her tribe, but she braved the danger of being captured, to stop for a sprig of the rose which grew beside her father's tent. She carried with her the lovely white rose with its golden heart, and tended it lovingly. To-day, the flower of the legend, the Cherokee rose, is the state flower.

**Size and Location.** Georgia is the largest of the original thirteen states, and, with its area of 59,265 square miles, is the largest state east of the Mississippi River. To the north of Georgia are Tennessee and North Carolina, to the east South Carolina and the Atlantic Ocean, to the south Florida, and to the west Alabama. The Savannah and Tugaloo rivers form the boundary between Georgia and South Carolina, and the Chattahoochee River about half of that between Georgia and Alabama.

**The People.** In size the twentieth among the states of the Union, Georgia ranks twelfth in population, and among the Southern states

# GEORGIA

|                                |         |                                   |        |                                 |       |                                 |       |                                |        |
|--------------------------------|---------|-----------------------------------|--------|---------------------------------|-------|---------------------------------|-------|--------------------------------|--------|
| Abba, (F7) . . . . .           | 100     | Bowman, (F2) . . . . .            | 730    | Corinth, (B4) . . . . .         | 140   | Emerson, (C2) . . . . .         | 393   | Hagan, (H6) . . . . .          | 356    |
| Abbeville, (F7) . . . . .      | 1,119   | Bremen, (B3) . . . . .            | 917    | Cork, (E4) . . . . .            | 150   | Empire, (F6) . . . . .          | 970   | Hahira, (F8) . . . . .         | 864    |
| Acree, (E7) . . . . .          | 200     | Brentwood, (H7) . . . . .         | 100    | Cornelia, (F1) . . . . .        | 1,274 | Enecks, (K5) . . . . .          | 150   | Halcyon Dale (J5) . . . . .    | 200    |
| Acworth, (C2) . . . . .        | 1,117   | Brewton, (G5) . . . . .           | 247    | Corsica, (H6) . . . . .         | 150   | Enigma, (F8) . . . . .          | 340   | Hamilton, (C5) . . . . .       | 437    |
| Adairsville, (C2) . . . . .    | 814     | Bridgeboro, (E8) . . . . .        | 350    | Cotton, (D8) . . . . .          | 153   | Enterprise, (F3) . . . . .      | 100   | Hammett, (D5) . . . . .        | 250    |
| Adel, (F8) . . . . .           | 1,720   | Brinson, (C9) . . . . .           | 476    | Council, (G9) . . . . .         | 250   | Epworth, (D1) . . . . .         | 191   | Hampton, (D4) . . . . .        | 927    |
| Adrian, (G5) . . . . .         | 740     | Bristol, (H8) . . . . .           | 212    | Covena, (H5) . . . . .          | 124   | Eson Hill, (B3) . . . . .       | 150   | Hapeville, (D3) . . . . .      | 1,631  |
| Aikenton, (E4) . . . . .       | 98      | Brownwood, (D7) . . . . .         | 520    | Covington, (E3) . . . . .       | 3,203 | Etna, (B3) . . . . .            | 80    | Haralson, (C4) . . . . .       | 176    |
| Ailey, (G6) . . . . .          | 385     | Brookfield, (F8) . . . . .        | 150    | Covington Mills, (E3) . . . . . | 124   | Eton, (C1) . . . . .            | 313   | Harlem, (H4) . . . . .         | 798    |
| Aimar, (J7) . . . . .          | 100     | Brooklet, (J6) . . . . .          | 600    | Crandall, (C1) . . . . .        | 193   | Eudora, (E4) . . . . .          | 200   | Harrison, (G5) . . . . .       | 345    |
| Ainslie, (F6) . . . . .        | 100     | Brooks, (C4) . . . . .            | 256    | Crawford, (F3) . . . . .        | 186   | Euhalee, (C2) . . . . .         | 200   | Hartwell, (G2) . . . . .       | 2,323  |
| Alamo, (G6) . . . . .          | 563     | Brownstown, (J8) . . . . .        | 150    | Crawfordville, (G3) . . . . .   | 784   | Everett City (J8) . . . . .     | 150   | Harville, (J6) . . . . .       | 100    |
| Alapaha, (F8) . . . . .        | 503     | Broxton, (G7) . . . . .           | 696    | Creighton, (D2) . . . . .       | 300   | Ewing, (H9) . . . . .           | 100   | Hasty, (G8) . . . . .          | 100    |
| Albany, (D7) . . . . .         | 13,451  | Brunswick, (K8) . . . . .         | 16,809 | Crest, (D5) . . . . .           | 64    | Experiment, (D4) . . . . .      | 500   | Hately, (E7) . . . . .         | 110    |
| Alma, (H7) . . . . .           | 1,061   | Buchanan, (B3) . . . . .          | 491    | Crosland, (E8) . . . . .        | 81    | Faceville, (C9) . . . . .       | 330   | Hawkinsville, (E6) . . . . .   | 3,070  |
| Alpharetta, (D2) . . . . .     | 379     | Buckhead, (F3) . . . . .          | 451    | Culloden, (D5) . . . . .        | 361   | Fairburn, (C3) . . . . .        | 1,604 | Hazlehurst, (G7) . . . . .     | 1,383  |
| Altamaha, (H7) . . . . .       | 100     | Buenavista, (C6) . . . . .        | 1,230  | Culverton, (G4) . . . . .       | 340   | Faircloth, (D8) . . . . .       | 225   | Hebardville, (H8) . . . . .    | 100    |
| Alto, (E2) . . . . .           | 168     | Buford, (E2) . . . . .            | 2,500  | Cumming, (D2) . . . . .         | 607   | Fairfax, (G8) . . . . .         | 100   | Helen, (E1) . . . . .          | 176    |
| Alvaton, (C4) . . . . .        | 108     | Bullochville, (C5) . . . . .      | 332    | Cusseta, (C6) . . . . .         | 276   | Fair Mount, (C2) . . . . .      | 497   | Helena, (G6) . . . . .         | 928    |
| Ambrose, (G7) . . . . .        | 200     | Burroughs, (K7) . . . . .         | 100    | Cuthbert, (C7) . . . . .        | 3,022 | Fargo, (G9) . . . . .           | 300   | Hephzibah, (H4) . . . . .      | 650    |
| Americus, (D6) . . . . .       | 9,010   | Burtsboro, (D2) . . . . .         | 150    | Cyrne, (C9) . . . . .           | 150   | Farmdale, (C4) . . . . .        | 100   | Herndon, (H5) . . . . .        | 100    |
| Amsterdam, (D9) . . . . .      | 250     | Burnell, (B3) . . . . .           | 150    | Easley, (E3) . . . . .          | 244   | Farmington, (F3) . . . . .      | 100   | Herod, (D7) . . . . .          | 186    |
| Andersonville, (D7) . . . . .  | 196     | Bushnell, (F7) . . . . .          | 81     | Fayettleville, (C4) . . . . .   | 690   | Fayetteville, (C4) . . . . .    | 952   | Hiawassee, (E1) . . . . .      | 226    |
| Apalachee, (E3) . . . . .      | 398     | Butler, (D5) . . . . .            | 758    | Dahlonega, (D1) . . . . .       | 690   | Felton, (B3) . . . . .          | 200   | Hickox, (J8) . . . . .         | 199    |
| Appling, (H3) . . . . .        | 200     | Butts, (J5) . . . . .             | 100    | Daisy, (J6) . . . . .           | 350   | Flemington, (K7) . . . . .      | 100   | Higgston, (G6) . . . . .       | 161    |
| Arabi, (E7) . . . . .          | 532     | Byronville, (E6) . . . . .        | 414    | Dallas, (C3) . . . . .          | 1,245 | Ficklin, (G3) . . . . .         | 182   | High Shoals, (E3) . . . . .    | 424    |
| Aragon, (C2) . . . . .         | 850     | Byron, (E5) . . . . .             | 400    | Dalton, (C1) . . . . .          | 5,222 | Fife, (C3) . . . . .            | 150   | High Tower, (D2) . . . . .     | 100    |
| Arcade, (E2) . . . . .         | 108     | Cadwell, (G6) . . . . .           | 274    | Damascus, (C8) . . . . .        | 100   | Finleyton, (F6) . . . . .       | 200   | Hillsboro, (E4) . . . . .      | 315    |
| Arcadia, (K7) . . . . .        | 150     | Cairo, (D9) . . . . .             | 1,908  | Danburg, (G3) . . . . .         | 286   | Fish, (B3) . . . . .            | 100   | Fitzgerald, (F7) . . . . .     | 6,870  |
| Argyle, (G8) . . . . .         | 332     | Calhoun, (C2) . . . . .           | 1,955  | Danielsville, (F2) . . . . .    | 355   | Florence, (B6) . . . . .        | 150   | Hilton, (B8) . . . . .         | 93     |
| Arlington, (C8) . . . . .      | 1,331   | Calvary, (I9) . . . . .           | 220    | Danville, (F5) . . . . .        | 436   | Fleming, (K7) . . . . .         | 200   | Hiltonia, (J5) . . . . .       | 262    |
| Armena, (D7) . . . . .         | 162     | Camak, (G4) . . . . .             | 303    | Darien, (K8) . . . . .          | 823   | Flemington, (J7) . . . . .      | 100   | Hinesville, (J7) . . . . .     | 315    |
| Armuchee, (E2) . . . . .       | 200     | Camilla, (D8) . . . . .           | 2,136  | Dasher, (F9) . . . . .          | 100   | Flint, (D8) . . . . .           | 100   | Homeland, (J9) . . . . .       | 138    |
| Ashburn, (E7) . . . . .        | 2,116   | Camoochee, (H5) . . . . .         | 173    | Dasho, (G5) . . . . .           | 653   | Flintstone, (B1) . . . . .      | 142   | Hiram, (C3) . . . . .          | 329    |
| Atco, (C2) . . . . .           | 200     | Campania, (H4) . . . . .          | 300    | Dawson, (D7) . . . . .          | 3,504 | Flippen, (D3) . . . . .         | 150   | Hiawassee, (E1) . . . . .      | 146    |
| Athens, (F3) . . . . .         | 18,787  | Capmon, (E3) . . . . .            | 220    | Dawsonville, (D2) . . . . .     | 198   | Florence, (B6) . . . . .        | 150   | Hogansville, (B4) . . . . .    | 1,591  |
| Atkinson, (J8) . . . . .       | 200     | Canoe, (H6) . . . . .             | 100    | Dealing, (H4) . . . . .         | 256   | Flovilla, (E4) . . . . .        | 371   | Hollingsworth, (D2) . . . . .  | 216    |
| ATLANTA, (I3) . . . . .        | 255,100 | Canon, (F2) . . . . .             | 1,132  | Debruce, (H4) . . . . .         | 100   | Flowery Branch, (D2) . . . . .  | 100   | Hollywood, (F1) . . . . .      | 100    |
| Attapulgus, (C9) . . . . .     | 360     | Canton, (D2) . . . . .            | 2,679  | Decatur, (D3) . . . . .         | 6,150 | Fort Oglethorpe, (B1) . . . . . | 250   | Homeland, (J9) . . . . .       | 138    |
| Auburn, (E2) . . . . .         | 290     | Carroll, (B1) . . . . .           | 100    | Dasher, (F9) . . . . .          | 100   | Hutching, (F3) . . . . .        | 200   | Homer, (F2) . . . . .          | 291    |
| Augusta, (J3) . . . . .        | 56,700  | Carlton, (E2) . . . . .           | 125    | Deepstep, (G4) . . . . .        | 184   | Folkston, (H9) . . . . .        | 397   | Homerville, (G8) . . . . .     | 627    |
| Auraria, (E2) . . . . .        | 150     | Carlton, (G2) . . . . .           | 342    | Deercourt, (F1) . . . . .       | 100   | Folsom, (C2) . . . . .          | 100   | Hortense, (H8) . . . . .       | 125    |
| Austell, (C3) . . . . .        | 758     | Carnesville, (F2) . . . . .       | 400    | Demorest, (E1) . . . . .        | 686   | Forest Park, (D3) . . . . .     | 308   | Hoschton, (E2) . . . . .       | 377    |
| Autreyville, (E8) . . . . .    | 200     | Carrollton, (C3) . . . . .        | 4,363  | Denton, (G7) . . . . .          | 300   | Forsyth, (E4) . . . . .         | 2,241 | Howard, (D5) . . . . .         | 100    |
| Avalon, (F2) . . . . .         | 100     | Cartersville, (C2) . . . . .      | 4,350  | Desoto, (D7) . . . . .          | 216   | Fort Gaines, (C7) . . . . .     | 1,237 | Howell, (G9) . . . . .         | 198    |
| Avera, (H4) . . . . .          | 258     | Cass Station, (C2) . . . . .      | 150    | Deveraux, (F4) . . . . .        | 350   | Fort Oglethorpe, (B1) . . . . . | 250   | Hubert, (J6) . . . . .         | 100    |
| Axon, (G8) . . . . .           | 340     | Cassville, (C2) . . . . .         | 400    | Dexter, (F6) . . . . .          | 481   | Fort Screven, (L6) . . . . .    | 150   | Huching, (F3) . . . . .        | 200    |
| Babcock, (C8) . . . . .        | 360     | Cave Spring, (B2) . . . . .       | 738    | Dickey, (C7) . . . . .          | 165   | Fort Valley, (E5) . . . . .     | 3,223 | Huff, (J2) . . . . .           | 100    |
| Baconton, (D8) . . . . .       | 568     | Cecil, (F8) . . . . .             | 307    | Diffee, (C9) . . . . .          | 150   | Fowlstown, (C9) . . . . .       | 250   | Hull, (F2) . . . . .           | 148    |
| Baden, (E9) . . . . .          | 150     | Cedartown, (B2) . . . . .         | 4,053  | Dillard, (F1) . . . . .         | 175   | Franklin, (B4) . . . . .        | 317   | Huntsville, (C2) . . . . .     | 150    |
| Bainbridge, (C9) . . . . .     | 4,792   | Center, (F2) . . . . .            | 185    | Dixie, (E9) . . . . .           | 233   | Frazier, (F6) . . . . .         | 95    | Ideal, (D6) . . . . .          | 304    |
| Bairdstown, (F3) . . . . .     | 100     | Chatsworth, (C1) . . . . .        | 472    | Doctor Town, (J7) . . . . .     | 100   | Freehomes, (D2) . . . . .       | 200   | Ila, (F2) . . . . .            | 232    |
| Baldwin, (E1) . . . . .        | 193     | Chattahoochee, (F1) . . . . .     | 125    | Doe run, (E8) . . . . .         | 919   | Froloma, (B4) . . . . .         | 225   | Indian Springs, (E4) . . . . . | 100    |
| Ball Ground, (D2) . . . . .    | 809     | Cochran, (C3) . . . . .           | 800    | Douglas, (G8) . . . . .         | 125   | Fruitland, (G9) . . . . .       | 200   | Inman, (D4) . . . . .          | 285    |
| Banning, (C3) . . . . .        | 470     | Coosa, (F6) . . . . .             | 408    | Donald, (J7) . . . . .          | 150   | Fry, (D1) . . . . .             | 100   | Jackson, (C8) . . . . .        | 496    |
| Bannockburn, (G8) . . . . .    | 350     | Covington, (B2) . . . . .         | 100    | Donelsonville, (C8) . . . . .   | 1,031 | Fulterville, (C3) . . . . .     | 299   | Jacksonville, (G7) . . . . .   | 379    |
| Barnesville, (D4) . . . . .    | 3,059   | Cheerkee, (C2) . . . . .          | 100    | Dooling, (D6) . . . . .         | 184   | Funston, (E8) . . . . .         | 157   | Jewett, (F7) . . . . .         | 300    |
| Barnett, (G3) . . . . .        | 450     | Chester, (F6) . . . . .           | 397    | Doraville, (D3) . . . . .       | 152   | Gabbierville, (B5) . . . . .    | 100   | Irwinville, (F7) . . . . .     | 114    |
| Barnett Shoals, (F3) . . . . . | 200     | Chestnuthurst, (C4) . . . . .     | 100    | Dorchester, (K7) . . . . .      | 250   | Gainesville, (E2) . . . . .     | 6,272 | Isabella, (E7) . . . . .       | 150    |
| Barney, (F8) . . . . .         | 259     | Chestnut Mountain, (E2) . . . . . | 100    | Douglas, (G8) . . . . .         | 3,401 | Gard, (J7) . . . . .            | 100   | Isle of Hope, (K7) . . . . .   | 100    |
| Bartow, (G4) . . . . .         | 582     | Chickamauga, (B1) . . . . .       | 965    | Douglasville, (C3) . . . . .    | 2,159 | Garfield, (H5) . . . . .        | 416   | Ivey, (F5) . . . . .           | 100    |
| Barwick, (E9) . . . . .        | 422     | China Hill, (F7) . . . . .        | 180    | Dover, (J5) . . . . .           | 150   | Gay, (C4) . . . . .             | 290   | Jackson, (E4) . . . . .        | 2,027  |
| Batson, (F6) . . . . .         | 100     | Chipley, (C5) . . . . .           | 728    | Draeketown, (B3) . . . . .      | 200   | Georgetown, (B7) . . . . .      | 244   | Jacksonville, (G7) . . . . .   | 450    |
| Baxley, (II7) . . . . .        | 1,142   | Chula, (E7) . . . . .             | 130    | Drybranch, (F5) . . . . .       | 110   | Gibson, (G4) . . . . .          | 462   | Jakin, (B8) . . . . .          | 430    |
| Beach, (G8) . . . . .          | 349     | Cisco, (C1) . . . . .             | 100    | Dublin, (G5) . . . . .          | 100   | Gibson, (F4) . . . . .          | 225   | James, (F5) . . . . .          | 100    |
| Beachton, (D9) . . . . .       | 210     | Clarkesville, (E1) . . . . .      | 542    | Ducktown, (D2) . . . . .        | 49    | Girard, (J4) . . . . .          | 300   | Jasper, (D2) . . . . .         | 386    |
| Bethlehem, (E3) . . . . .      | 246     | Clinton, (K6) . . . . .           | 100    | Duluth, (D3) . . . . .          | 227   | Gordon, (F8) . . . . .          | 200   | Jefferson, (F2) . . . . .      | 1,626  |
| Between, (E3) . . . . .        | 101     | Clyde, (K6) . . . . .             | 100    | Dunwoody, (D3) . . . . .        | 600   | Glenmore, (G8) . . . . .        | 200   | Jeffersonville, (F5) . . . . . | 842    |
| Beverly, (G2) . . . . .        | 132     | Coal Mountain, (D2) . . . . .     | 1,265  | Dunwoody, (D3) . . . . .        | 125   | Glenville, (J7) . . . . .       | 1,069 | Jenkinsburg, (D4) . . . . .    | 300    |
| Belfast, (K7) . . . . .        | 300     | Claxton, (J6) . . . . .           | 677    | Dunwoody, (D3) . . . . .        | 125   | Glenwood, (G6) . . . . .        | 592   | Jersey, (E3) . . . . .         | 202    |
| Bellton, (E2) . . . . .        | 149     | Clayton, (F1) . . . . .           | 100    | DuPont, (G9) . . . . .          | 381   | Glovers, (E4) . . . . .         | 150   | Jesup, (J7) . . . . .          | 1,941  |
| Bellville, (H6) . . . . .      | 400     | Clem, (B3) . . . . .              | 100    | Durand, (C5) . . . . .          | 232   | Godfrey, (F4) . . . . .         | 255   | Jewell, (G4) . . . . .         | 570    |
| Bemiss, (F9) . . . . .         | 100     | Clemont, (E2) . . . . .           | 100    | Eden, (K6) . . . . .            | 100   | Good Hope, (E3) . . . . .       | 248   | Jonesboro, (D3) . . . . .      | 1,060  |
| Benevolence, (C7) . . . . .    | 200     | Cleveland, (E1) . . . . .         | 339    | East Ellijay, (D1) . . . . .    | 285   | Gordon, (F5) . . . . .          | 1,081 | Julia, (C6) . . . . .          | 100    |
| Berlin, (E8) . . . . .         | 310     | Climax, (D9) . . . . .            | 345    | East Lake, (D3) . . . . .       | 611   | Gordon, (F5) . . . . .          | 100   | Juliette, (E4) . . . . .       | 100    |
| Berryton, (B2) . . . . .       | 300     | Clinton, (E4) . . . . .           | 350    | Eastman, (T6) . . . . .         | 2,707 | Gordy, (E8) . . . . .           | 100   | Junction City, (D5) . . . . .  | 323    |
| Bethlehem, (E3) . . . . .      | 246     | Clyde, (K6) . . . . .             | 100    | East Point, (C3) . . . . .      | 5,241 | Gough, (H4) . . . . .           | 200   | Kennesaw, (C2) . . . . .       | 467    |
| Between, (E3) . . . . .        | 101     | Clyo, (K6) . . . . .              | 300    | East Thomaston, (F3) . . . . .  | 5,241 | Gradyville, (D9) . . . . .      | 303   | Kestler, (C8) . . . . .        | 373    |
| Bogart, (E3) . . . . .         | 430     | Clinton, (F4) . . . . .           | 110    | Eastville, (F3) . . . . .       | 1,058 | Graham, (H7) . . . . .          | 1,200 | Lafayette, (B1) . . . . .      | 2,104  |
| Bold Springs, (E3) . . . . .   | 99      | Comer, (F2) . . . . .             | 1,001  | Grantville, (C4) . . . . .      | 188   | Graysonville, (C4) . . . . .    | 322   | Lagrange, (B4) . . . . .       | 23,523 |
| Bolingbroke, (E5) . . . . .    | 115     | Commerce, (F2) . . . . .          | 2,459  | Elliaville, (D6) . . . . .      | 693   | Greenvale, (B1) . . . . .       | 100   | Lawrenceville, (F2) . . . . .  | 2,059  |
| Bolton, (D3) . . . . .         | 150     | Concord, (D4) . . . . .           | 442    | Elliott, (E8) . . . . .         | 210   | Grovetown, (F9) . . . . .       | 350   | Lafayette, (B1) . . . . .      | 176    |
| Boston, (E9) . . . . .         | 1,640   | Collegepark, (C3) . . . . .       | 3,622  | Elberta, (F2) . . . . .         | 1,000 | Grove Hill, (J6) . . . . .      | 1,200 | Lafayette, (C4) . . . . .      | 176    |
| Bostwick, (E3) . . . . .       | 424     | Conyers, (D3) . . . . .           | 1,817  | Ellenwood, (D3) . . . . .       | 100   | Grove Hill, (J6) . . . . .      | 1,200 | Lake Park, (F9) . . . . .      | 310    |
| Bowdon, (E3) . . . . .         | 1,047   | Cooksville, (B4) . . . . .        | 100    | Ellerslie, (C5) . . . . .       | 100   | Guyton, (K6) . . . . .          | 539   | Lambert, (J7) . . . . .        | 200    |
| Bowersville, (G2) . . . . .    | 390     | Coolidge, (E8) . . . . .          | 483    | Ellijay, (C1) . . . . .         | 100   | Gwynn, (E5) . . . . .           | 200   | Lawnovia, (F2) . . . . .       | 1,644  |
| Bowdon, (E3) . . . . .         | 1,047   | Cordele, (E6) . . . . .           | 6,538  | Elmodel, (D8) . . . . .         | 150   | Habersham, (E1) . . . . .       | 336   | Lawrenceville, (E2) . . . . .  | 2,059  |



# GEORGIA *Continued*

|                              |        |                          |       |                                |        |                             |        |                                  |        |
|------------------------------|--------|--------------------------|-------|--------------------------------|--------|-----------------------------|--------|----------------------------------|--------|
| Leary, (D8).....             | 465    | Millen, (J5).....        | 2,405 | Pepperton, (E4).....           | 381    | Scottdale, (D3).....        | 400    | Tilton, (C1).....                | 99     |
| Leeburg, (D7).....           | 786    | Millerville, (E6).....   | 100   | Perkins, (J5).....             | 230    | Scottsboro, (F4).....       | 150    | Toccoa, (F1).....                | 3,567  |
| Lela, (C9).....              | 296    | Millhaven, (J5).....     | 200   | Perry, (E6).....               | 678    | Screven, (H8).....          | 364    | Toombsboro, (F5).....            | 420    |
| Leliaton, (G8).....          | 300    | Miltown, (F8).....       | 860   | Pidcock, (E9).....             | 310    | Seabrook, (K7).....         | 100    | Towns, (G6).....                 | 196    |
| Lenox, (F8).....             | 339    | Millwood, (G8).....      | 200   | Pinehurst, (E6).....           | 596    | Seney, (B2).....            | 120    | Traders Hill (H9).....           | 100    |
| Leon, (I6).....              | 100    | Milner, (D4).....        | 407   | Pinepark, (D9).....            | 233    | Seneca, (C4).....           | 906    | Trenton, (A1).....               | 295    |
| Leslie, (D7).....            | 470    | Milstead, (E3).....      | 400   | Pineview, (F6).....            | 474    | Sessions, (G8).....         | 100    | Trion, (B1).....                 | 1,588  |
| Letford, (J6).....           | 250    | Mincola, (F9).....       | 100   | Pitts, (E7).....               | 352    | Seville, (E7).....          | 172    | Tucker, (D3).....                | 150    |
| Lexington, (F3).....         | 469    | Mineralbluff, (D1).....  | 226   | Plainfield, (F6).....          | 100    | Shadydale, (F4).....        | 294    | Tugalo, (F1).....                | 100    |
| Levsy, (H6).....             | 100    | Mitchell, (G4).....      | 257   | Plains, (D6).....              | 611    | Sharon, (G3).....           | 282    | Tunnelhill, (B1).....            | 208    |
| Lilburn, (D3).....           | 150    | Modoc, (H5).....         | 200   | Plainville, (C2).....          | 91     | Sharpe, (B1).....           | 100    | Turin, (C4).....                 | 239    |
| Lilly, (E6).....             | 258    | Molena, (D4).....        | 411   | Pleasant Hill (D5).....        | 110    | Sharpburg, (C4).....        | 170    | Tybee, (L6).....                 | 117    |
| Limerick, (K7).....          | 200    | Moniac, (H9).....        | 184   | Point Peter, (F3).....         | 250    | Shaw, (B1).....             | 100    | Tyrone, (C4).....                | 100    |
| Lincolnton, (G3).....        | 657    | Monroe, (E3).....        | 3,211 | Poeler, (K6).....              | 443    | Shearwood, (C1).....        | 270    | Ty Ty, (E8).....                 | 403    |
| Lindale, (E2).....           | 2,650  | Montezuma, (E6).....     | 1,827 | Popes Ferry, (E4).....         | 100    | Snelman, (C7).....          | 1,074  | Unadilla, (E6).....              | 1,103  |
| Linton, (F4).....            | 200    | Monticello, (L4).....    | 1,823 | Portal, (J5).....              | 200    | Sheltonville, (D2).....     | 150    | Union City (C3).....             | 620    |
| Linwood, (B1).....           | 615    | Montrose, (F5).....      | 210   | Porterdale, (L3).....          | 2,880  | Shiloh, (CS).....           | 250    | Unionpoint, (G3).....            | 1,126  |
| Lithia Springs, (C3).....    | 229    | Mordland, (C4).....      | 321   | Potterville, (D5).....         | 300    | Shinger, (E7).....          | 100    | Upton, (G7).....                 | 100    |
| Lithonia, (D3).....          | 1,239  | Morgan, (C7).....        | 341   | Poulan, (E8).....              | 586    | Siloam, (F3).....           | 243    | Upenville, (II9).....            | 58     |
| Lizella, (E5).....           | 150    | Morganton, (D1).....     | 171   | Powder Sprs, (C3).....         | 336    | Smars, (E5).....            | 200    | Uvalda, (G6).....                | 240    |
| Locust Grove, (D4).....      | 529    | Morrison, (J6).....      | 100   | Powelton, (G4).....            | 100    | Smiley, (J7).....           | 100    | Vallambrosa, (F5).....           | 100    |
| Loganville, (E3).....        | 711    | Morven, (E9).....        | 530   | Preston, (C6).....             | 110    | Smithonia, (F3).....        | 198    | Valdosta, (F9).....              | 12,554 |
| Lone Oak, (C4).....          | 169    | Moultrie, (E8).....      | 6,789 | Pratsburg, (D5).....           | 100    | Smithville, (D7).....       | 761    | Van Wert, (B3).....              | 221    |
| Lothair, (G6).....           | 130    | Mountain City, (F1)..... | 210   | Princeton, (F3).....           | 67     | Smyrna, (D3).....           | 791    | Vaudeh, (D3).....                | 200    |
| Louisville, (H4).....        | 1,040  | Mount Airy, (F1).....    | 343   | Pulaski, (J6).....             | 250    | Snow, (E6).....             | 150    | Vidalia, (H6).....               | 2,860  |
| Louvale, (C6).....           | 54     | Mount Vernon, (D4).....  | 221   | Raleigh, (C5).....             | 63     | Sonoraville, (C2).....      | 1,781  | Vidette, (H4).....               | 569    |
| Lovejoy's Station, (D4)..... | 221    | (G6).....                | 300   | Ranger, (C1).....              | 145    | Soperton, (G6).....         | 1,033  | Vienna, (E6).....                | 2,019  |
| Lovelace, (C5).....          | 300    | Mountville, (C4).....    | 300   | Ray City, (F8).....            | 700    | Spann, (G5).....            | 100    | Vilanow, (B1).....               | 100    |
| Lovett, (G5).....            | 237    | Mystic, (F7).....        | 237   | Raymond, (C4).....             | 110    | Sparta, (G4).....           | 1,895  | Vila Rica, (C3).....             | 1,047  |
| Ludowici, (J7).....          | 515    | Nacoochee, (F1).....     | 200   | Reayle, (G3).....              | 150    | Springhaven, (F6).....      | 377    | Waco, (B3).....                  | 333    |
| Ludville, (C2).....          | 100    | Nahntua, (J8).....       | 150   | Raymond, (C4).....             | 150    | Springplace, (C1).....      | 208    | Wadley, (H5).....                | 1,423  |
| Luella, (D4).....            | 100    | Nashville, (F8).....     | 2,025 | Rebecca, (F7).....             | 331    | Springvale, (C7).....       | 148    | Walden, (F5).....                | 140    |
| Lula, (E2).....              | 367    | Naylor, (I9).....        | 302   | Redan, (I3).....               | 120    | Stapleton, (H1).....        | 410    | Walthourville, (J7).....         | 100    |
| Lulaton, (J8).....           | 150    | Nelson, (D2).....        | 511   | Redeak, (D3).....              | 100    | Starssville, (E3).....      | 200    | Warehboro, (I8).....             | 175    |
| Lumber City, (G7).....       | 978    | Newborn, (I3).....       | 409   | Red Stone, (E2).....           | 44     | Statenville, (F9).....      | 150    | Waring, (P3).....                | 100    |
| Lumpkin, (C6).....           | 934    | Newell, (I9).....        | 200   | Register, (J6).....            | 300    | Statesboro, (J6).....       | 3,807  | Warm Springs,                    |        |
| Luthersville, (C4).....      | 359    | New England, (A1).....   | 722   | Reidsville, (H1).....          | 553    | Statham, (E3).....          | 720    | (C5).....                        | 100    |
| Luxomni, (D3).....           | 150    | New Holland, (E2).....   | 139   | Remerton, (F9).....            | 100    | Staunton, (P8).....         | 100    | Warrenton, (G4).....             | 1,407  |
| Lyerly, (B2).....            | 323    | New Newington, (J5)..... | 900   | Reno, (D9).....                | 46     | Stellaville, (I4).....      | 138    | Warthen, (G1).....               | 228    |
| Lyons, (H6).....             | 873    | Newington, (J5).....     | 364   | Rentz, (G6).....               | 219    | Stephens, (F3).....         | 200    | Warwick, (E7).....               | 274    |
| Lytle, (B1).....             | 100    | Newman, (C4).....        | 7,037 | Resaca, (C1).....              | 123    | Sterling, (J8).....         | 78     | Washington, (G3).....            | 4,208  |
| McCall, (C2).....            | 100    | Newton, (D8).....        | 377   | Resource, (K5).....            | 150    | Stevens, Pottery, (F5)..... | 200    | Wassav, (K6).....                | 721    |
| McCaysville, (D1).....       | 2,166  | Nicholls, (G7).....      | 936   | Rex, (D3).....                 | 101    | Stone Mountain, (F9).....   | 1,266  | Watkinsville, (E3).....          | 465    |
| McDonaldough, (D4).....      | 1,263  | Nicholson, (F2).....     | 250   | Reynolds, (D5).....            | 926    | Stilesboro, (C2).....       | 200    | Waverly Hall,                    |        |
| McIntosh, (J7).....          | 250    | Nicelly, (G7).....       | 100   | Reynoldsville, (C9).....       | 110    | Stillmore, (H6).....        | 916    | (C5).....                        | 300    |
| McIntyre, (F5).....          | 225    | Nona, (H4).....          | 200   | Rhine, (F6).....               | 396    | Stockbridge, (D3).....      | 386    | Waycross, (H8).....              | 20,098 |
| McKinnon, (J8).....          | 100    | Norcross, (D3).....      | 993   | Richland, (C6).....            | 1,529  | Stockton, (F9).....         | 200    | Waynesboro, (H4).....            | 3,855  |
| McRae, (G6).....             | 1,273  | Norman Park, (C6).....   | 565   | Richwood, (E6).....            | 300    | Stone Mountain, (F9).....   | 200    | Waynesville, (J8).....           | 420    |
| Mabel, (J8).....             | 100    | Normantown, (H1).....    | 167   | Ridgerville, (C5).....         | 149    | Stonewall, (C3).....        | 1,266  | Waymanville,                     |        |
| Mableton, (C3).....          | 300    | Norristown, (H5).....    | 177   | Ridgeville, (K8).....          | 300    | Summertown, (H15).....      | 1,093  | (D5).....                        | 200    |
| Machen, (E4).....            | 191    | Norwood, (G3).....       | 366   | Rincon, (K6).....              | 100    | Summererville, (B2).....    | 1,903  | Wayside, (F4).....               | 100    |
| Machinery City, (C3).....    | 137    | Nuberg, (G2).....        | 100   | Ringgold, (C1).....            | 472    | Summit, (H15).....          | 501    | Westpoint, (B5).....             | 2,138  |
| Macon, (E5).....             | 61,200 | Nunez, (H15).....        | 730   | Rising Fawn, (B1).....         | 304    | Summer, (E7).....           | 331    | Whaley, (G4).....                | 100    |
| Madison, (F3).....           | 2,348  | Nye, (G3).....           | 300   | Riverville, (D3).....          | 159    | Sumter, (D7).....           | 110    | Whigham, (D9).....               | 662    |
| Madras, (C4).....            | 100    | Oakfield, (E7).....      | 295   | Riverside, (E8).....           | 219    | Tanner, (E7).....           | 200    | White, (C2).....                 | 319    |
| Manassas, (H7).....          | 200    | Oakland, (C4).....       | 100   | Roberta, (D5).....             | 404    | Taylor, (F7).....           | 170    | Whitehall, (F3).....             | 387    |
| Manchester, (G5).....        | 2,776  | Oakwood, (E2).....       | 163   | Robertstown, (E1).....         | 243    | Tennille, (G7).....         | 1,578  | Whiteplains, (F4).....           | 479    |
| Manor, (G8).....             | 270    | Ochlocknee, (L9).....    | 410   | Rochelle, (F7).....            | 1,046  | Terrell, (H17).....         | 433    | Whitesburg, (B4).....            | 366    |
| Mansfield, (E4).....         | 618    | Ocilla, (F7).....        | 2,180 | Rockbridge, (G7).....          | 229    | Terrytown, (G6).....        | 1,093  | White Sulphur Springs, (C5)..... | 50     |
| Marblehill, (I2).....        | 400    | Odesdale, (C4).....      | 182   | Rockmart, (C2).....            | 1,400  | Tift, (E2).....             | 1,578  | Whitesville, (B5).....           | 100    |
| Marietta, (C3).....          | 6,190  | Odum, (J7).....          | 309   | Rocky Ford, (J5).....          | 522    | Toccoa, (G6).....           | 562    | Willett, (C6).....               | 100    |
| Marion, (D1).....            | 300    | Offerman, (H15).....     | 483   | Rocky Mount, (C4).....         | 61     | Townsend, (F1).....         | 1,413  | Williamson, (D4).....            | 249    |
| Marlow, (K6).....            | 100    | Ogeechee, (J5).....      | 130   | Rogers, (H15).....             | 300    | Tucker, (F7).....           | 1,547  | Wilcox, (G7).....                | 130    |
| Marshallville, (I6).....     | 1,150  | Oglethorpe, (I10).....   | 871   | Rolston, (D1).....             | 100    | Tulalip, (C5).....          | 1,093  | Willacoochee, (G8).....          | 2,211  |
| Martin, (F2).....            | 344    | Opoochee, (H6).....      | 149   | Rome, (B2).....                | 13,905 | Tulsa, (F1).....            | 95     | Willett, (C6).....               | 100    |
| Mason, (B4).....             | 100    | Ota, (D4).....           | 150   | Rooipville, (B4).....          | 200    | Tulsa, (F1).....            | 2,719  | Williams, (D14).....             | 320    |
| Masse, (F8).....             | 150    | Oliver, (J5).....        | 288   | Rosewood, (I17).....           | 100    | Tullalah Falls, (F1).....   | 105    | Willie, (J7).....                | 3,335  |
| Matthews, (H4).....          | 210    | Olympia, (F9).....       | 200   | Rossville, (P4).....           | 1,427  | Tullalah Park (F1).....     | 56     | Winder, (E3).....                | 204    |
| Maxey, (F3).....             | 356    | Omaha, (C6).....         | 262   | Rowell, (I2).....              | 1,227  | Tulmoe, (E2).....           | 150    | Winokur, (J8).....               | 153    |
| Mayfield, (C4).....          | 100    | Omega, (E8).....         | 329   | Roundcloak, (F4).....          | 100    | Turboro, (J9).....          | 150    | Winston, (C3).....               | 153    |
| Maysville, (C2).....         | 795    | Orange, (D2).....        | 100   | Roy, (D1).....                 | 100    | Tarrytown, (G6).....        | 273    | Winterville, (F3).....           | 504    |
| Meansville, (D4).....        | 229    | Orchard Hill, (D4).....  | 100   | Roston, (F2).....              | 1,681  | Terer, (G9).....            | 150    | Withers, (G9).....               | 105    |
| Mears, (J5).....             | 130    | Oxford, (E3).....        | 698   | Saint Marks, (C4).....         | 824    | Tate, (D2).....             | 500    | Woodbine, (J9).....              | 172    |
| Meigs, (D8).....             | 1,111  | Orield, (F7).....        | 457   | Saint Simons Island, (K8)..... | 643    | Taylor Creek, (F1).....     | 56     | Woodbury, (C5).....              | 923    |
| Meinhard, (K6).....          | 140    | Ousley, (U9).....        | 177   | Saint Charles, (C4).....       | 88     | Taylorville, (C2).....      | 140    | Woodcliff, (J5).....             | 109    |
| Meldrim, (K6).....           | 200    | Owensbyville, (B4).....  | 150   | Saint George, (H9).....        | 338    | Taylorville, (G2).....      | 258    | Woodstock, (D2).....             | 415    |
| Melrose, (F9).....           | 100    | Owens Ferry, (J9).....   | 200   | Saint Marks, (C4).....         | 59     | Tazewell, (I6).....         | 130    | Woodland, (C5).....              | 356    |
| Mendes, (H7).....            | 703    | Oxford, (E3).....        | 698   | Saint Marys, (K9).....         | 824    | Temple, (B3).....           | 621    | Woodville, (G3).....             | 458    |
| Menlo, (B2).....             | 378    | Ozell, (E9).....         | 208   | Saint Simons Mills, (K8).....  | 210    | Tenaga, (C1).....           | 100    | Woolsey, (I4).....               | 148    |
| Meriwether, (F4).....        | 100    | Palmetto, (C3).....      | 965   | Sasser, (D7).....              | 200    | Tennille, (G5).....         | 1,768  | Worth, (F7).....                 | 209    |
| Merrillville, (E9).....      | 204    | Parish, (J6).....        | 100   | Saint Simons Mills, (K8).....  | 230    | Texas, (B4).....            | 150    | Worthville, (E4).....            | 150    |
| Mesena, (G4).....            | 150    | Parrott, (C7).....       | 367   | Sale City, (D8).....           | 537    | Ihebes, (K7).....           | 100    | Wray, (F7).....                  | 260    |
| Metasville, (G3).....        | 275    | Patten, (D9).....        | 32    | Sale City, (D8).....           | 537    | Thelma, (G9).....           | 200    | Wrayswood, (F3).....             | 100    |
| Metcalif, (D9).....          | 351    | Patterson, (H8).....     | 357   | Sandersville, (G5).....        | 2,695  | The Rock, (D5).....         | 181    | Wrens, (H4).....                 | 1,074  |
| Metter, (H6).....            | 908    | Pavo, (E9).....          | 990   | Sardis, (J4).....              | 300    | Thomasaston, (D5).....      | 2,502  | Wrightsville, (G5).....          | 1,476  |
| Middleton, (C2).....         | 152    | Pearson, (G8).....       | 792   | Sargent, (C4).....             | 200    | Thomasville, (D9).....      | 10,301 | Yatesville, (D5).....            | 400    |
| Midland, (C5).....           | 110    | Pelham, (D8).....        | 2,640 | Sasser, (D7).....              | 402    | Thompson, (H4).....         | 2,140  | Yorkville, (C3).....             | 120    |
| Midville, (H5).....          | 985    | Pembroke, (J6).....      | 560   | Savannah, (K6).....            | 99,900 | Thunderbolt, (L6).....      | 750    | Young Harris, (E1).....          | 281    |
| Milan, (F6).....             | 593    | Pendergrass, (E2).....   | 277   | Scarborough, (J5).....         | 150    | Tifton, (F8).....           | 3,005  | Zebulon, (D4).....               | 629    |
| Milford, (C8).....           | 100    | Penfield, (F3).....      | 315   | Scotland, (G6).....            | 310    | Tiger, (F1).....            | 167    | Zeigler, (J5).....               | 100    |
| Milledgeville, (F4).....     | 4,619  | Penia, (E7).....         | 100   | Scott, (G5).....               | 212    | Tignall, (G3).....          | 633    | Zinke, (H8).....                 | 200    |

is second only to Texas. Georgia has more people to the square mile than Texas, and is in turn surpassed in this respect by Kentucky, North and South Carolina, Virginia, West Virginia, and Tennessee. At the formation of the Union, Georgia had 82,500 inhabitants; in 1920 the number had increased to 2,895,832. White people do not greatly predominate, for in 1920 there were 1,689,114 whites and 1,206,365 negroes. There are many counties in the state where there are more negroes than whites. Georgia has more negroes than any other state in the Union.

In Georgia, as in most of the other Southern states, a large proportion live under what may be called rural conditions; that is, either on farms or in towns of less than 2,500 people. In this proportion, however, there is a tendency to shift, the urban population increasing much more rapidly than the rural. Four cities have a population of more than 50,000: Atlanta, the capital and largest city; Savannah, near the mouth of the Savannah River, the chief seaport; Augusta and Macon, important centers of the cotton industry. Other cities of local importance are Albany, La Grange, Valdosta, Columbus, Athens, Waycross, Rome, and Brunswick.

This Empire State of the South differs very decidedly from the Northern Empire State, New York, in its proportion of foreign-born inhabitants. In the latter, this is very large, while in Georgia but six-tenths of one per cent of the population are of foreign birth. Thus far, it has been almost entirely unknown soil to immigrants.

*Religion.* Among religious sects, the Baptists are by far the strongest, having over half of the church members of the state. The founder of Methodism, John Wesley, visited the colony with his brother Charles in 1736, and George Whitefield, one of the most powerful preachers of that denomination, founded an orphanage near Savannah in 1738. The Sunday school established by John Wesley at Bethesda, near Savannah, in 1736, is said to have been the first Sunday school in the world.

*Education.* The economic destruction of Georgia during the War of Secession naturally reacted upon its educational program. Money was lacking for schools; the agricultural population was widely distributed; there was need for two sets of schools, white and colored. All of these factors contributed to Georgia's slowness in educational progress. Awakened to its great need, Georgia, in the first quarter of the century, passed constitutional amendments to solve some of its educational problems and to provide for the financial support of more and better schools.

In 1919 education, made compulsory for lower grades in 1916, was made compulsory

through the seventh grade; and half the state income was set aside for educational use. In 1920, schools for adult education were authorized, and in 1922, a normal school for negroes was provided. Between 1910 and 1920, white illiteracy dropped from 7.8 per cent to 5.4 per cent; negro illiteracy, from 36.5 per cent to 29.1 per cent.

In the larger cities and towns there are graded and high schools for both white and colored children. There are state normal schools at Americus, Statesboro, Athens, Savannah, Albany, Valdosta, and Bowdon, and a number of state agricultural schools. There are many institutions of higher learning in the state, among which are the following:

**Agnes Scott College**, at Decatur, a Presbyterian college for women.

**Atlanta University**, a famous non-sectarian school for negroes, established in 1867 and opened two years later.

**Berry School**, at Mount Berry, was founded by Martha Berry as a school for mountain boys and girls. Started in a one-room log cabin, this school now has ninety buildings and 6,000 acres of ground. Training in agriculture and in the industrial trades is given at Berry.

**Clark University**, at Atlanta, founded in 1870, is a school for negroes.

**Emory University**, at Atlanta, is a coeducational college, the principal Methodist institution in the Southeast. Affiliated with it is the Atlanta Medical College.

**Georgia School of Technology**, founded in 1888 to aid in the industrial development of the state, is at Atlanta.

**Georgia State College for Women**, at Milledgeville, was founded in 1889. It provides normal and training courses.

**Georgia State Industrial College** for colored men, at Savannah, was founded in 1891.

**Georgia State Teachers' College**, at Athens, offers courses leading to two-year normal-diploma and four-year degree courses; it is devoted to the training of teachers and is coeducational.

**Georgia State Women's College**, at Valdosta, was started in 1911 and offers professional teachers' courses.

**Mercer University**, at Macon, is a Baptist college for men, founded in 1837. It includes Mercer College and schools of theology, law, commerce, and journalism.

**North Georgia Agricultural College**, at Dahlonega, a coeducational state college, offers courses in arts and sciences, agriculture, pedagogy, mining, and engineering.

**Oglethorpe University**, founded in 1835 and closed during the War of Secession, was reopened in 1916. It is a coeducational Presbyterian college, and is near Atlanta.

**South Georgia Agricultural College**, at Tifton, was founded in 1906, and is a state college.

**University of Georgia**, the oldest state university in the United States, located at Athens, Ga. It was chartered in 1785, but was not formally opened until 1801. According to the provisions of its charter, the primary and secondary schools of the state have an official connection with the university.

The institution includes the following colleges and departments: colleges of agriculture, of liberal arts, and of pharmacy, the graduate school, schools of education, commerce, and journalism, and a law department.

**Wesleyan College**, at Macon, founded in 1836, was one of the first women's colleges in the United States to grant degrees to women.

**The Land.** The different topographical regions of Georgia are well marked, though in general it may be said that there is a gradual slope from the northern part toward the coastal plain in the southeast. In the north a triangular section with an area of about 6,000 square miles is crossed from northeast to southwest by the Blue Ridge Mountains. These are not towering peaks, but their abrupt valleys, steep cliffs, and domelike summits make a scenic region of great beauty. In the extreme northwestern corner, in that portion of the Cumberland Plateau which projects into the state from Tennessee, is located Chickamauga National Military Park, a memorial of the great battle fought in September, 1863.

[For another great memorial to the War of Secession, see STONE MOUNTAIN.]

In the south, the Blue Ridge district gradually gives way to the Piedmont Region (which see). This section of rolling country, diversified with broad hills and narrow valleys, is the most densely settled part of the state. The northern edge of this region is about 1,500 feet in altitude, but at the fall line, where the land drops to the coastal plain, it is only about 300 feet. The direction of this fall line may be easily traced on the map, for its course across the state is marked by a line joining the cities of Columbus, Macon, Milledgeville, and Augusta. These cities have developed at the fall line because of the excellent water power which the drop in the rivers furnishes (see FALL LINE).

Stretching away to the southeast is the coastal plain, with an area more than half that of the entire state. For the most part, this plain is low and level, but here and there occur ridges and valleys which seem like miniature mountain ranges. Once this region was densely forested with pines; now it is an agricultural section, as well as one of the most progressive portions of the state. In the southeastern corner, extending into Florida, is the Okefenokee Swamp, one of the largest swamps in the United States.

**Rivers.** Georgia has 540 square miles of water surface. The rivers of the northwestern valley region and those which are confined to the coastal plain are in general rather sluggish, but most of the great rivers might join the Chattahoochee in its wonderful *Song*, as written by Sidney Lanier, the Georgia poet:

I hurry amain to reach the plain,  
Run the rapid and leap the fall,  
Split at the rock and together again,  
Accept my bed, or narrow or wide,  
And flee from folly on every side  
With a lover's pain to attain the plain;

for they rise in the mountains, cross the Piedmont Region, and find their way to the plain, where they are large enough to carry down to the Atlantic or the Gulf of Mexico the traffic of the territory through which they flow. The extreme northernmost portion of the state is drained into the Tennessee, and thence by a roundabout course through the Mississippi into the Gulf of Mexico, but most of the drainage of the state finds its way directly to the Atlantic or the Gulf. From east to west, the large rivers are the Savannah; the Altamaha, formed by the junction of the Oconee and the Ocmulgee; the Flint; and the Chattahoochee. The first two empty into the Atlantic; the Flint joins the Chattahoochee just at the boundary line of Florida; together, as the Apalachicola, they follow their channel through Florida to the Gulf.

**Climate.** Scientists recognize in the United States nine climate belts, and Georgia has examples of all but one of these. The coldest, which has an average yearly temperature of less than  $40^{\circ}$ , is to be found only on the mountain tops. In general, the temperature for the state is very moderate, and the growing season is from 210 to 260 days. The rainfall averages about fifty-one inches for the state.

**Agriculture.** The chief occupation of the people is agriculture. Because the climate shows a decided variation, a wide range of crops can be produced. The soils, too, most of which are very fertile, are various. On the coastal plain, where the climate is mild and delightful, and the growing season nearly nine months, cotton is raised in vast quantities. Until recently, cotton formed over two-thirds of the total crops of the state. Georgia, once second to Texas in the production of cotton, now ranks fifth or sixth. A state dependent upon a single crop for its income passes through alternate periods of prosperity and poverty, and Georgia farmers have begun to see this. Increasing acreage has been given to corn, which is now second to cotton, wheat, hay, sweet potatoes, tobacco, fruits, and nuts. Georgia leads the other states in the production of watermelon, and is usually second or third in the production of sweet potatoes.

Georgia peaches are known everywhere, and the state stands second to California in the number of bushels picked. Other fruits of less importance are apples and pears. Pecans flourish both on the coast and in the inland counties, Georgia ranking third among the states in their production. Peanuts are an important crop, in the production of which



Photo: U & U

**A Scene in Old Savannah.** A new view of Victory Drive, a palm-lined boulevard, bordering the city for three miles.

## GEORGIA PRODUCTS CHART

Millions of Dollars Annually

### THE FACTORY

|                            | 0 | 10 | 20 | 30 | 40 | 50 |
|----------------------------|---|----|----|----|----|----|
| Cotton                     |   |    |    |    |    |    |
| Lumber, Timber             |   |    |    |    |    |    |
| Fertilizers                |   |    |    |    |    |    |
| Food Preparations          |   |    |    |    |    |    |
| Cars, Construction Repairs |   |    |    |    |    |    |
| Cottonseed Oil, Cake, Meal |   |    |    |    |    |    |
| Printing, Publishing       |   |    |    |    |    |    |
| Planing Mill Products      |   |    |    |    |    |    |
| Turpentine, Rosin          |   |    |    |    |    |    |
| Knit Goods                 |   |    |    |    |    |    |
| Foundry, Machine Shop      |   |    |    |    |    |    |
| Bread, Bakery              |   |    |    |    |    |    |
| Flour, Feed                |   |    |    |    |    |    |
| Slaughtering, Meat Packing |   |    |    |    |    |    |
| Furniture                  |   |    |    |    |    |    |
| Men's Clothing             |   |    |    |    |    |    |
| Flavoring Extracts, Syrups |   |    |    |    |    |    |
| Marble, Stone              |   |    |    |    |    |    |
| Beverages                  |   |    |    |    |    |    |
| Bags, Other Than Paper     |   |    |    |    |    |    |
| Clay Products              |   |    |    |    |    |    |
| Ice, Manufactured          |   |    |    |    |    |    |
| Confectionery              |   |    |    |    |    |    |
| Mattresses, Bed Springs    |   |    |    |    |    |    |
| Peanuts                    |   |    |    |    |    |    |
| Gas, Manufactured          |   |    |    |    |    |    |
| Wood Preserving            |   |    |    |    |    |    |
| Patent Medicines           |   |    |    |    |    |    |
| Ice Cream                  |   |    |    |    |    |    |
| Woolen Goods               |   |    |    |    |    |    |

100

150

200

### THE QUARRY

|               |
|---------------|
| Clay, Raw     |
| Stone         |
| Clay Products |

### THE FARM

|                  |
|------------------|
| Wheat            |
| Potatoes         |
| Watermelons      |
| Horses and Colts |
| Sugar Cane       |
| Pecans           |
| Eggs             |
| Peanuts          |
| Oats             |
| Poultry Raised   |
| Peaches          |
| Sweet Potatoes   |
| Hay              |
| Tobacco          |
| Swine            |
| Dairy Products   |
| Cottonseed       |
| Cattle           |
| Mules            |
| Corn             |
| Cotton           |

Georgia usually ranks among the first four states.

In the mountainous portion of the state, there is an abundance of pasturage for cattle, and hogs are numerous in the wooded districts.

In all, two-thirds of the land of Georgia is called farm land, but only about one-half of this is actually cultivated, much of it being in forests. Many of the smaller farms are operated by negroes, either owners or tenants, and there has been a remarkable development along agricultural lines among the colored people of the state in recent years.

**Forests.** Reference has been made above to the extensive forests of Georgia. These are to be found in every part of the state, but their composition differs in different localities. The *Song of the Chattahoochee*, quoted here, describes accurately the northern forests:

The hickory told me manifold  
Fair tales of shade; the poplar tall  
Wrought me her shadowy self to hold;  
The chestnut, the oak, the walnut, the pine,  
Overleaning with flickering meaning and sign,  
Said, "Pass not, so cold, these manifold  
Deep shades of the hills of Habersham,  
These glades in the valleys of Hall."

In the southern part, on the other hand, the forests are chiefly of the famous Georgia pine, the most important tree of the state.

There are almost 240,000 acres in national forests. A state board of forestry was created in 1921, and attempts are being made to conserve the forest lands of the state in an effort to remedy earlier, wasteful methods of lumbering.

**Mining.** Georgia is particularly fortunate in having abundant water power in certain sections, as its supply of coal is not extensive, and only a few hundred thousand tons are mined each year. Indeed, the mineral wealth of the state is not great, Georgia ranking usually thirty-seventh in mineral production. The chief mineral products are granite, barytes, clay, bauxite, iron ore, and marble. The mines at Attapulgus, in the southwest corner of the state, furnish about forty per cent of the fuller's earth used in the oil refineries of the country. The marble that is found in the northwestern part of the state is the purest and whitest produced in the United States; from it have been built the state capitols of Rhode Island, Minnesota, Kentucky, and Arkansas, and the Corcoran Art Gallery and

the Pan-American Building, at Washington. From this great vein, from which the Indians dug marble for their corn-grinding mortars, an immense cube of marble weighing seventy-six tons (one of the largest blocks ever quarried) was shipped to Chicago for the great Buckingham Memorial Fountain (see CHICAGO).

**Manufactures.** Excellent water transportation and water power of almost unlimited possibilities combine to make this one of the foremost industrial states of the South. Cheap water power is playing its part in transforming Georgia from a purely agricultural state to an industrial section. After one season in which power ran short, the hydroelectric systems of Northern Georgia and Alabama were linked for mutual service. In 1927 the throwing of a switch at the Carolina-Virginia line opened up the world's greatest interconnection of electric power, joining the great Southern plants with the Northern, to the advantage of communities and industries as far south as Mobile and as far west as Chicago. All companies operate independently, but stand ready to furnish power to each other as may be needed.

It would almost be possible, by a study of the other industries of Georgia, to assume what the chief manufacturing enterprises must be. The state is a great cotton producer, and cotton goods rank ahead of any other manufactured product in value.

High in value is the manufacture of cotton-seed oil, now largely used as a salad and cooking oil. The meal, left after the extraction of the oil, is used as cattle feed or fertilizer. The manufacture of fertilizer is third on the list of the state's valuable manufactures, and Georgia leads all the states in this product.

A large percentage of the state is forested, much of it with the quick-growing Georgia pine, and lumber and timber products are fifth in value. At one time it seemed that wasteful methods of timbering had checked the production of naval stores, but modern methods of manufacture are overcoming former handicaps, forests are being regrown, and Georgia again leads the states in the manufacture of rosin and turpentine.

**Transportation and Trade.** That Georgia is not dependent for transportation upon its large number of navigable rivers is proved by the fact that its greatest city, Atlanta, the "Gate City of the South," is not on or near a waterway. Indeed, the rivers are being less used for transportation as the railroad mileage increases. There are at present in the state about 7,000 miles of railway, the Central of Georgia, the Southern Railway System, the Seaboard Air Line, and the Atlantic Coast Line having the greatest mileage. Among the other railways serving the state are the Georgia; the Atlanta & West Point; the Louisville &

Nashville; the Nashville, Chattanooga & Saint Louis; and the Atlanta, Birmingham & Coast railways. Atlanta, Savannah, Augusta, Macon, Columbus, Athens, Albany, and Waycross have become important railroad towns, and Savannah is also one of the chief seaports of the South. In the harbor of the city, the United States government has excavated a channel twenty-six feet deep.

The commerce of Georgia with the other states is large, chiefly owing to its production of cotton and marble; for, while the manufacture of cotton products is ever increasing, by no means all the raw material is used in the state. Cotton goods, too, are exported, as well as lumber and other forest products, while the imports consist of those articles not manufactured within the state, and food products not raised locally with profit.

**Government.** Georgia is governed under a constitution which dates from 1877.

The executive department of the government is in the hands of a governor, secretary of state, comptroller, treasurer, attorney-general, commissioner of agriculture, state superintendent of schools, state geologist, and state librarian, all of whom are elected for two years. After he has served two terms consecutively, the governor may not be reelected for four years.

The legislative department consists of a house of representatives and a senate, the latter body having fifty-one members and the former 206. Members of each house are elected for two years, and the legislature holds annual sessions of not more than fifty days.

The judicial power is vested in a supreme court consisting of a chief justice and five associates, chosen for six years by popular vote; a court of appeals composed of three members, also elected by the people for a term of six years; and superior courts, which are held in each judicial district. There are also courts of ordinary, justices of the peace, and solicitors-general for each judicial district.

**History.** Georgia, which was named for George II of England, was the most southerly of the thirteen original colonies. Its territory was explored in 1540 by De Soto, and in 1562 the Frenchman, Ribault, sailed along its shores. The Spaniards, seeking everywhere for gold, sank their mines in its mountains, and though they found no gold, they discovered traces of other metals sufficient to lead them to oppose the efforts of the English to seize the land, for Georgia was a part of the original Carolina grant.

**Colonial Period.** In 1732 the British government ceded the territory to a company organized to "establish the colony of Georgia in America," and very early in the next year, James Oglethorpe landed with his first colonists. His object was to found a settlement

## QUESTIONS ON GEORGIA

(An outline suitable for Georgia will be found with the article "State.")

What are "naval stores," and to what extent are they produced in Georgia?

Why was the readmission of Georgia to the Federal Union, after the War of Secession, delayed until 1871?

What are the principal railroads that serve the state, and the extent of the railroad mileage?

Name two great memorials commemorating the War of Secession in this state.

Why does the fact that there are many streams with a rapid fall mean more to Georgia than it would to Pennsylvania?

Discuss briefly the dependence of Georgia's manufacturing industries upon its natural resources.

Who was chiefly responsible for the strong Union sentiment that existed in the state at the outbreak of the War of Secession?

What notable religious teachers visited the colony in its early days?

If Georgia's chief crop were destroyed, who besides the planters would suffer? Would it make much difference outside of the state?

Give an account for a popular name that is applied to the state and one that is applied to its capital.

What were the chief Indian tribes of the territory? What was the cause of the friction between them and the white inhabitants?

What makes the educational problem a difficult one in this state? What attempts are being made to solve it?

Name two manufactured products in which Georgia leads all the states.

If you should suddenly open your eyes in a Georgia forest, how would you know whether you were in the northern or the southern part of the state?

What brought about a change for the worse in the condition of the colony about 1740?

What state of the North bears a popular name much like that of Georgia? How do the two states differ as to the character of their population?

What two rivers of the state receive a new name as soon as they cross the boundary?

How large a part of the so-called farm land is actually under cultivation? Is the remainder mere waste land?

Who founded the colony of Georgia? How did it rank among the original colonies as to age? For whom was it named?

How many cities have more than 50,000 people? Is the tendency of the inhabitants toward the farm or toward the city?

What fruit raised in Georgia is famous throughout the country?

Who was the first white man to explore the territory? What was the aim of the Spaniards in establishing settlements?

How many states are larger than Georgia? How many of these are east of the Mississippi?

Why has the tendency been of late toward diversified farming rather than toward an increase in cotton production?

What sort of a region is Okefenokee Swamp?

For what mineral product, used by the Indians, is Georgia famed to-day? Name another which is of value to the oil-refining industry.

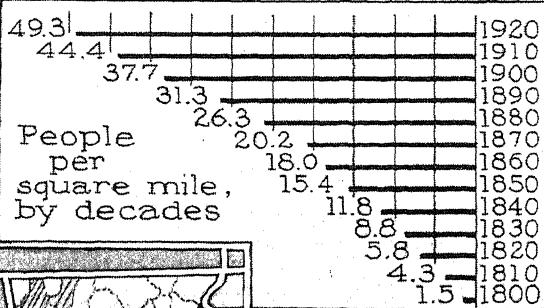
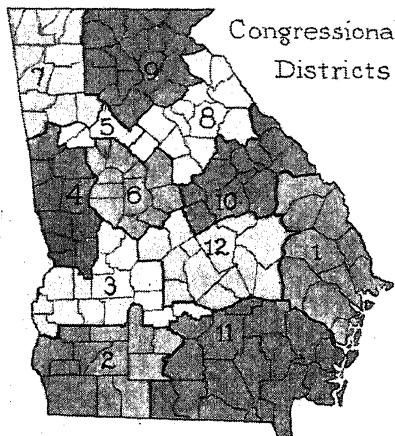
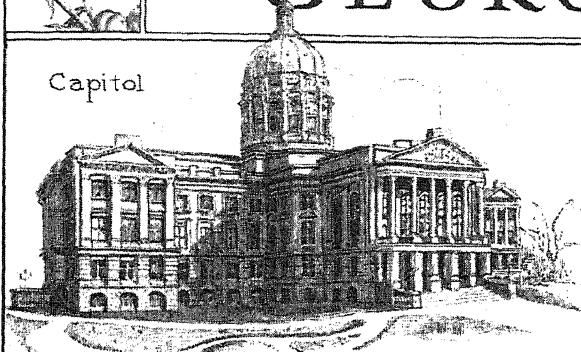
What well-known character in fiction was created by a Georgian author?

What is the state flower?

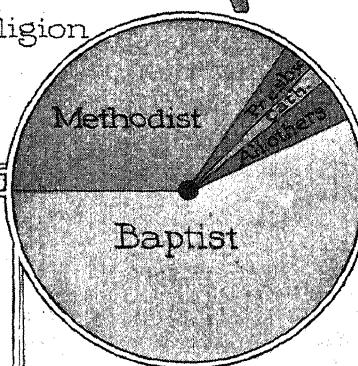
How many states raise more cotton?

# GEORGIA

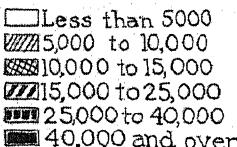
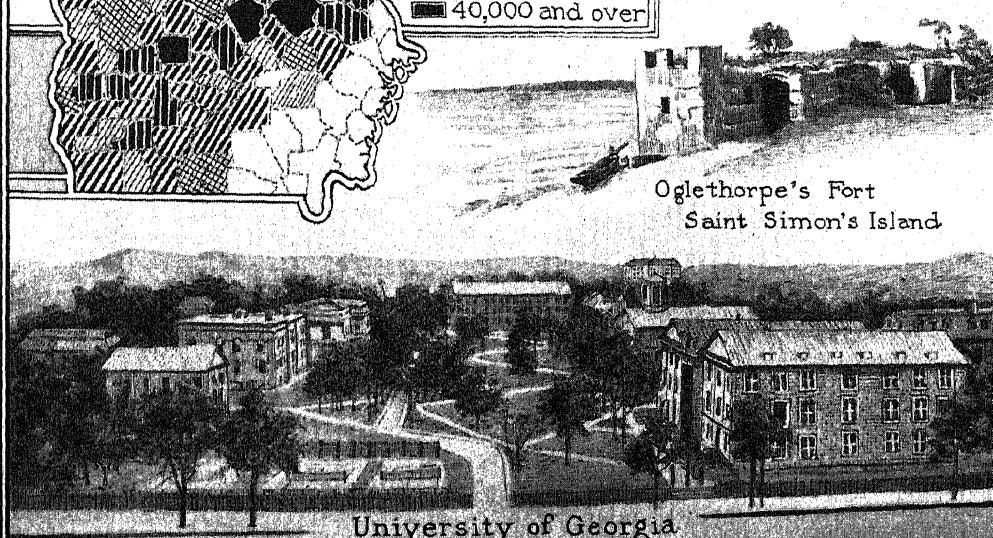
Capitol



Religion



Cotton production in bales

Oglethorpe's Fort  
Saint Simon's Island

University of Georgia

where poor debtors from England, and Protestants who had been driven by persecution from Europe, might find a refuge. Savannah was established in 1733, but even under its liberal government the colony was not exceedingly prosperous. The Spaniards of the neighboring territories never ceased their aggressions, and in 1740 the Georgian colonists were involved in actual war with them.

Oglethorpe returned to England in 1743, and affairs in the colony became increasingly worse. Slavery and rum, which by the original rules of the colony were forbidden, were introduced in 1749. In 1763 the charter of the colony expired, and the colony was organized as a royal province under the control of the British Parliament. If left to itself, Georgia would have continued quietly under this rule, for there was little cause for complaint given; but the spirit of the other colonies affected it also, and it sent delegates to the Continental Congress. During the War of the Revolution that followed, Georgia bore its part, and as a result suffered at the hands of the British.

*Early Years of Statehood.* In 1778 Georgia ratified the Articles of Confederation, and ten years later was among the first to ratify the Federal Constitution. The most pressing questions in these early years of statehood concerned the Creek and Cherokee Indians, who, during most of the history of the colony, had been distinctly unfriendly. Control of the Indian lands was eagerly sought, and in 1802 the state gave up to the Federal government all its territory west of the Chattahoochee, in return for the promise that the title of the land should be gradually taken away from the Indians and vested in the state. This compromise did not settle the matter, however, and at intervals open warfare broke out, while conflicts between the state and Federal governments were frequent. But in 1832 the Creeks were driven out, and six years later, the last of the Cherokees were removed from the territory.

*War and Reconstruction.* Though Georgia was industrially as dependent upon slave labor as were the other Southern states, and though it held most firmly to the conviction that the Federal government had no right to prohibit slavery in a territory or to refuse admission to a slave state, there existed a strong sentiment in favor of the Union. The leader in this was Alexander H. Stephens, one of the strongest and most capable men that the South developed during the war period. Despite his efforts, however, the election of Lincoln was followed by the calling of a convention, which on January 19, 1861, passed an ordinance of secession, 208 delegates voting for it and eighty-nine against it.

During the war, Georgia was the scene of important military operations (see *WAR OF SECESSION*), including Sherman's march "from

Atlanta to the sea," and few, if any, of the states suffered more. Four-fifths of the public property, it was estimated, was destroyed during the raids of the Northern forces, and the commercial depression that followed was very serious. Nor did the reconstruction policy inaugurated by President Johnson better matters. Carpetbaggers (which see) gained control of the government, and the wealth of the state was wasted in reckless speculation and in frauds. Within three years the public debt was increased from \$5,000,000 to \$16,000,000, and the accusations of embezzlement against men in high government positions were not in all cases unfounded. The ordinance of secession was repealed and a new constitution adopted, but Congress, as was natural under the circumstances, objected to the attitude of the state toward the negroes, and set up military rule; and not until the beginning of 1871 was the state finally readmitted.

*Recent Development.* The history of the state since the Reconstruction period has been largely one of progress and development of the abundant resources. The growth in manufactures, considerable as it is, has but begun, and the industrial future of the state appears most promising.

Politically, Georgia has been since 1871 almost uniformly Democratic, though between 1890 and 1898 the Populists gained a strong influence. Recent legislation has dealt with workmen's compensation, child-labor regulation, and acts to encourage coöperative marketing, purchase of agricultural machinery, and coöperative financing.

M.L.D.

*Other Items of Interest.* Near Savannah there is a government bamboo plantation which was started, about 1890, from a single shoot. From this plantation the United States Department of Agriculture ships thousands of plants throughout the South and Southwest.

Among the famous sons and daughters of Georgia, the two best known are the poet, Sidney Lanier, and Joel Chandler Harris, creator of "Uncle Remus."

The first Girl Scout troop was formed in Savannah in 1912.

Each year at Fort Valley is celebrated the Peach Blossom Festival. From far and near, people come to see the orchards in blossom and the pageant which celebrates the bringing of the peach from its original home in the East.

Dr. Crawford W. Long, a Georgian, was the first surgeon to use ether as an anesthetic, employing it in an operation performed in 1842 (see LONG, CRAWFORD W.).

The timbers for the keel of the *Constitution* came from Georgia.

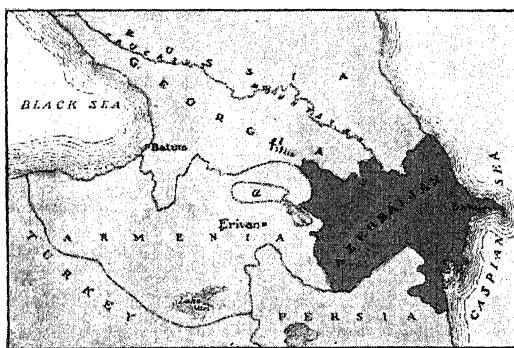
*Related Subjects.* The following articles in these volumes will help the reader to gain a more detailed knowledge of the state of Georgia:

#### CITIES AND TOWNS

In addition to the following cities which appear in their order in these volumes, others are located [on the back of the state map]:

|                       |                 |
|-----------------------|-----------------|
| Atlanta               | Columbus        |
| Augusta               | Macon           |
| Savannah              |                 |
|                       |                 |
| LEADING PRODUCTS      |                 |
| Corn                  | Peach           |
| Cotton                | Peanut          |
| Lumber                | Sugar Cane      |
| Marble                | Turpentine      |
| Nut                   | Watermelon      |
|                       |                 |
| RIVERS                |                 |
| Chattahoochee         | Savannah        |
|                       |                 |
| SURFACE FEATURES      |                 |
| Appalachian Mountains | Piedmont Region |
| Blue Ridge            | Stone Mountain  |

GEORGIA, for centuries celebrated for the unusual beauty of its women and the strength of its men, is a small country lying east of the Black Sea, with the present Azerbaijan and Armenia as eastern and southern neighbors.



LOCATION MAP

Georgia's position in the Transcaucasian Federation of Soviet Republics.

bors; it is now politically allied with them. The section, with frequently changing boundaries, has had an authentic history since the days of Alexander the Great. It was vassal territory to the king of Armenia in the second century; the Arabs conquered it later and forced a Mohammedan rule upon the people; Russia took it in 1798, after a virtual protectorate covering about 300 years, beginning in 1492, when the little state needed a strong friend during a war between the Persians and the Turks.

When the Russian Empire fell, in 1917, Georgia proclaimed its independence and established a republic, but the succeeding communist government of Russia brought it under nominal subjection, and Georgia embraced bolshevism. In December, 1921, the young republic was incorporated with Armenia and Azerbaijan into the Transcaucasian Socialist Federated Soviet Republic, allied to the Union of Socialist Soviet Republics (Russia).

Georgia proper has an area of 25,520 square miles, and a population of 2,400,000. The capital city is Tiflis; the port of the country is Batum. These are the only towns of importance.

Batum, on a magnificent harbor on the eastern shore of the Black Sea, is one of the great petroleum ports of the world. It is also a large shipping point for wheat and manganese ore. In 1921, because of common interests of various Soviet states in Southern Russia, it was made a free port (see FREE PORTS). Population 50,000.

Tiflis, the capital of Georgia and of the Transcaucasian Soviet federation, is located south and east of the center of the country. It is also the intellectual center of the federation, for it has a university, established in 1918, which has had a splendid growth. There is a typically Oriental quarter of the city, but in progressiveness, the modern part equals any other city of its size in its part of the world. There is railway connection with Batum. Population, 293,000.

GEORGIAN, *jor' ji an*, BAY, formerly called LAKE MANITOULIN, an arm of Lake Huron, lying wholly in the province of Ontario. It extends eastward from Lake Huron, from which it is almost completely shut off by Manitoulin and other islands, and by the Bruce Peninsula. Between Manitoulin Island and the mainland, on the north, is the North Channel, a picturesque little strait, with rocky bluffs along the shore. The eastern shores of the bay are low and rocky, but on the north they are high and bold, like the north shore of Lake Superior. The most striking feature of the bay is the vast number of small islands, said to exceed 20,000, which dot its waters. The attractiveness of these islands for summer homes and hotels is drawing a rapidly increasing number of temporary residents, with the result that Georgian Bay is perhaps best known as a summer resort.

Georgian Bay is about 120 miles long and fifty miles wide, and in many places exceeds 300 feet in depth. Numerous rivers empty into it, chief among them being the French, from Lake Nipissing; the Muskoka, from the chain of lakes of that name; and the Severn, from Lake Simcoe. The Trent Canal, completed in 1918, connecting Lake Simcoe with Talbot River and thence by a chain of lakes with Trent River, provides a through water route from Georgian Bay to the Bay of Quinte on Lake Ontario. The Canadian government has under consideration the construction of a Georgian Bay Ship Canal, to connect the northeastern section of the Bay with Montreal. See CANADA (Transportation).

GEORGIA, STRAIT OF. See JUAN DE FUCA.

GEORGIA SCHOOL OF TECHNOLOGY. See GEORGIA (Education).

GEORGIA STATE COLLEGE FOR WOMEN. See GEORGIA (Education).

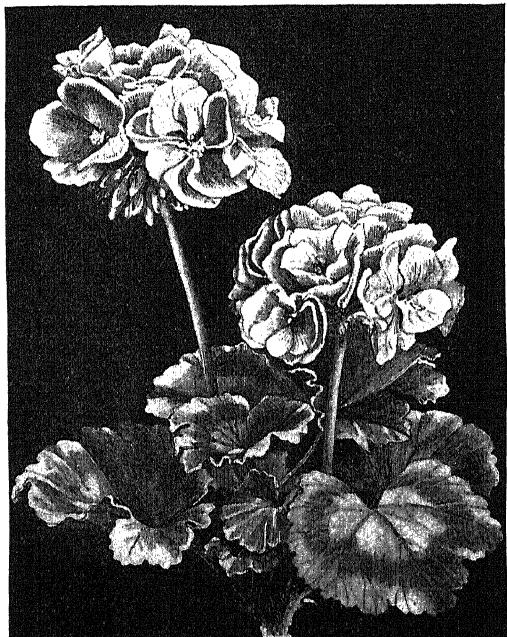
GEORGIA STATE TEACHERS' COLLEGE. See GEORGIA (Education).

GEORGIA STATE WOMEN'S COLLEGE. See GEORGIA (Education).

GEORGICS, *jor' jiks*. See VERGIL.

GERANIUM, *je ra' ni um*. The plants whose fragrant foliage and brilliant blooms of red or

pink make them such popular indoor flowers are really species of *Pelargonium*, native to South Africa and Australia. Species of the genus *Geranium* are not cultivated to any extent, and when the indoor gardener talks about her winter-flowering geraniums, she is referring to what botanists call pelargoniums. Geraniums, so-called, are widely grown in the home because they adapt themselves readily to conditions found in the ordinary living room. They are also successfully grown in the garden. They root readily from slips, those for summer blooming being taken from plants in early spring, and those for winter flowering, from fall plants. Care must be taken not to have the soil too rich, as an excess of fertilizer will cause too much leafage. Geraniums need plenty of sunshine and enough water to keep the roots moist. It is injurious to their growth, however, to have standing water about the



THE GERANIUM  
As a house plant.

roots. The plants should be cut back and shaped when potted for winter growth, as otherwise they will become too tall and ragged-looking.

Under cultivation, many different forms of geraniums have been developed, with variations in size and coloring of the blossoms, and in the markings, texture, and fragrance of the leaves. In California and other places with similar climatic conditions, the plants grow to the size of a bush or extensive vine. There are four recognized geranium groups, namely, *ivy*, *scarlet horseshoe*, *Lady Washington*, and *rose*.

The ivy-leaved are favorites for winter boxes. Leaves of rose geranium are often used to flavor jellies.

Several wild species belonging to the genus *Geranium* are popularly called *cranesbill* be-



Photo: Visual Education Service

WILD GERANIUM  
Cranesbill.

cause of the shape of the fruit. The herb Robert is a wild species that has been used medicinally as an astringent.

B.M.D.

**Scientific Names.** These plants all belong to the geranium family, *Ceraniaceae*. The cultivated forms are derived especially from *Pelargonium peltatum*, *P. zonale*, and *P. inquinans*. The common cranesbill of the United States and Canada is *Geranium maculatum*. The herb Robert is *G. robertianum*.

**GERARD, JAMES WATSON** (1867- ), an American diplomat who was called upon to represent his country in one of the most critical periods of its history. In 1913 he was appointed ambassador to Germany by President Wilson; the following year saw the great powers of Europe engaged in the World War, in the course of which the relations between Germany and the United States became repeatedly strained, as a result of the German submarine policy. Throughout the period when the two nations were attempting to come to an understanding through diplomatic correspondence, Gerard conducted his office with admirable skill and tactfulness. In February, 1917, when President Wilson severed diplomatic relations between the two countries, he was recalled.

Gerard was born in Geneseo, N. Y., and was graduated from Columbia University (1900) and Columbia Law School (1902). For three years, from 1908 to 1911, he served as associate justice of the supreme court of New York. In 1914 he was an unsuccessful candidate for United States Senator. He is the author of

*My Four Years in Germany* and *Face to Face with Kaiserism*.

GERHARDT, PAUL (1607-1676), the most noted writer of hymns in the German Lutheran Church. He was born in Saxony, and became dean at the Church of St. Nicholas in Berlin, in 1657. He attempted to bring about a union of the Lutheran and Reformed churches, in opposition to the Elector Frederick William, and was banished in 1666 from Brandenburg. He was pastor at Lübben during the last seven years of his life.

GERM, *jurm*, in its broadest sense, the term applied to the earliest stage in the growth of a living organism. For example, the botanist calls the embryo of a seed the germ of the plant, and the sprouting of the seed is known as germination. In popular language, the terms *bacteria* and *germs* are used synonymously when reference is made to the minute organisms which cause most of the human diseases. R.H.

**Related Subjects.** The reader is referred in these volumes to the following articles:

|          |             |
|----------|-------------|
| Bacteria | Embryo      |
| Disease  | Germination |

GERMAN ARMY. See ARMY, subhead.

GERMAN EAST AFRICA, a German colony until 1917, during the World War. It is now Tanganyika Territory (which see).

GERMANICUS CAESAR. See TIBERIUS.

GERMANIUM. See CHEMISTRY (Elements).

GERMAN LANGUAGE, one of the great languages of the world, spoken by about 80,000,000 people. Within the German republic, over ninety per cent of the inhabitants use some form of German speech, while in Austria and in Switzerland there are millions of German-speaking people. To those unacquainted with it, German is not a musical language, owing to its guttural sounds, and those who are accustomed only to English find it difficult to master German because of its very different sentence order, its inflections, and its custom of building compound words by merely joining together simple ones. The very characteristic tendency to place some verb form at or near the close of the sentence was described by Mark Twain in the words, "The German dives into the Atlantic of his sentence and comes up on the other side with a verb in his mouth." As for the custom of word-building, those who speak other tongues may well be envious, for in German it is possible to express in one adjective an idea for which another language would have to make use of cumbersome phrases and clauses. What other language, for instance, could achieve such a triumph as "the with-great-pleasure-a-large-red-apple-eating child"?

German is much more nearly phonetic than is English; that is, it has fewer silent letters and fewer variations in the sounds of letters.

If a learner has mastered thoroughly the sound-value of every German vowel, consonant, and diphthong, he need not fear to pronounce any word he sees, for it is almost certain to be sounded just as it is written. Especially rich in synonyms, German affords opportunity for most exquisite effects in word-choice, and no language better fulfills the demands of the orator and the poet.

Historical. The term *German* includes two branches, the High German and the Low German, but only the former is considered here, the latter having special treatment under the heading PLATTDEUTSCH. The growth of the German language has been a gradual development through three periods, the Old High German (700-1100), Middle High German (1100-1500), and Modern German, from 1500 to the present time. In the earlier periods, each section of the country spoke a different dialect and no attempt was made at unifying, but when German became the official language of the imperial court, the particular dialect spoken there came to be looked upon as superior to the others. Its use spread in official circles, and by the beginning of the Modern German period, this one branch was so much more commonly understood than any other that it was the natural one for Luther to use when he came to translate the Bible. Frequently, it is stated that Luther gave to the German language its literary form, but this is not true. It had practically crystallized before his time, but he helped very decidedly to widen the knowledge of it. Every German who wanted to read his Bible had to know the particular dialect in which it was written.

To-day there are numerous dialects in German, as there are in most languages spoken by a very large number of people, but the language of books is the same wherever German is used.

GERMAN LITERATURE. As English literature runs back into the old Anglo-Saxon, so German grew gradually out of the medieval Gothic, and at approximately the same period; but distinguished names do not appear in the history of German literature nearly as early as in the English. The three greatest writers England has produced—Shakespeare, Milton, and Chaucer—all lived early in its literary history, but before the beginning of the eighteenth century Germany had only one author of first rank, and that was Martin Luther. Though German literary achievement has thus been crowded into a comparatively brief period, it is worthy to rank with that of any other great nation. No scholars are more profound than those of Germany, and from no other country have so many systems of philosophy been issued; no poets are more exquisitely lyrical than the Germans, and German songs are sung the world over; while in Goethe,

Germany has one master who stands with the few dominant literary figures of the world.

**Early Period.** As in most countries, literature began in Germany with the songs of the minstrels, the *sagas* of great heroes. These were written, or sung, rather, in various dialects and were merely local in their appeal, for Germany was not in those early times a nation, but a group of little, warring states. But a national feeling was being born, and every emperor who did anything to unite the severed states, or to increase German power at the expense of some other country, was helping to give it life. With the birth of a national spirit, there came into being in the early thirteenth century the great national epic, the *Nibelungenlied*. This was not the product of a single poet or a single time, but was woven of the ballads and folk tales of innumerable minstrels of the centuries that were past. The spirit of the Crusades was abroad, and the love of chivalry was voiced by the German *Minnesingers*, who correspond in a measure to the troubadours of France.

In time, this first spontaneous outburst of song died away, and poetry became more stilted and artificial. The *Meistersingers* took the place of the *Minnesingers*, and the commercial spirit of the times made itself felt, even through the poetry.

**The Reformation Period.** An upheaval was preparing which should both startle men's minds into keenness and banish artificiality—the great Protestant Reformation. Luther is the commanding figure of this period in its literature as in its history, and his translation of the Bible was the one truly great work handed down by it to later times. Of literature, in the sense of easy and graceful tales or serious writing, there was practically none; everybody was interested in some phase of the Reformation and cared more to advance that cause than to produce matter that was formally correct. Even the chief poet of the era, the picturesque *Meistersinger*, Hans Sachs, sounded the aggressive spiritual note in his songs. From the close of the Reformation period to the beginning of the eighteenth century, little that was noteworthy was produced. The Thirty Years' War so exhausted the country that the people had no heart for literature.

**From the Eighteenth Century to the Present.** It seems little short of marvelous to turn from such dearth of literary accomplishment to the richness of this later period. As the country recovered from the disastrous effects of the Thirty Years' War, a new feeling of nationality began to awaken, and this was intensified by Frederick the Great and his achievements in the Seven Years' War. This powerful ruler gave no special encouragement to German literature, but it grew up about him and actually helped him in his work of building up a

real Germany, with Prussia as a center. The technique of poetry improved much in the hands of Klopstock, the first master of the modern German lyric; the new spirit of freedom and expansion found expression in Wieland; German drama rose to fresh heights with the production of Lessing's great plays; and almost every field of German thought felt the influence of Herder.

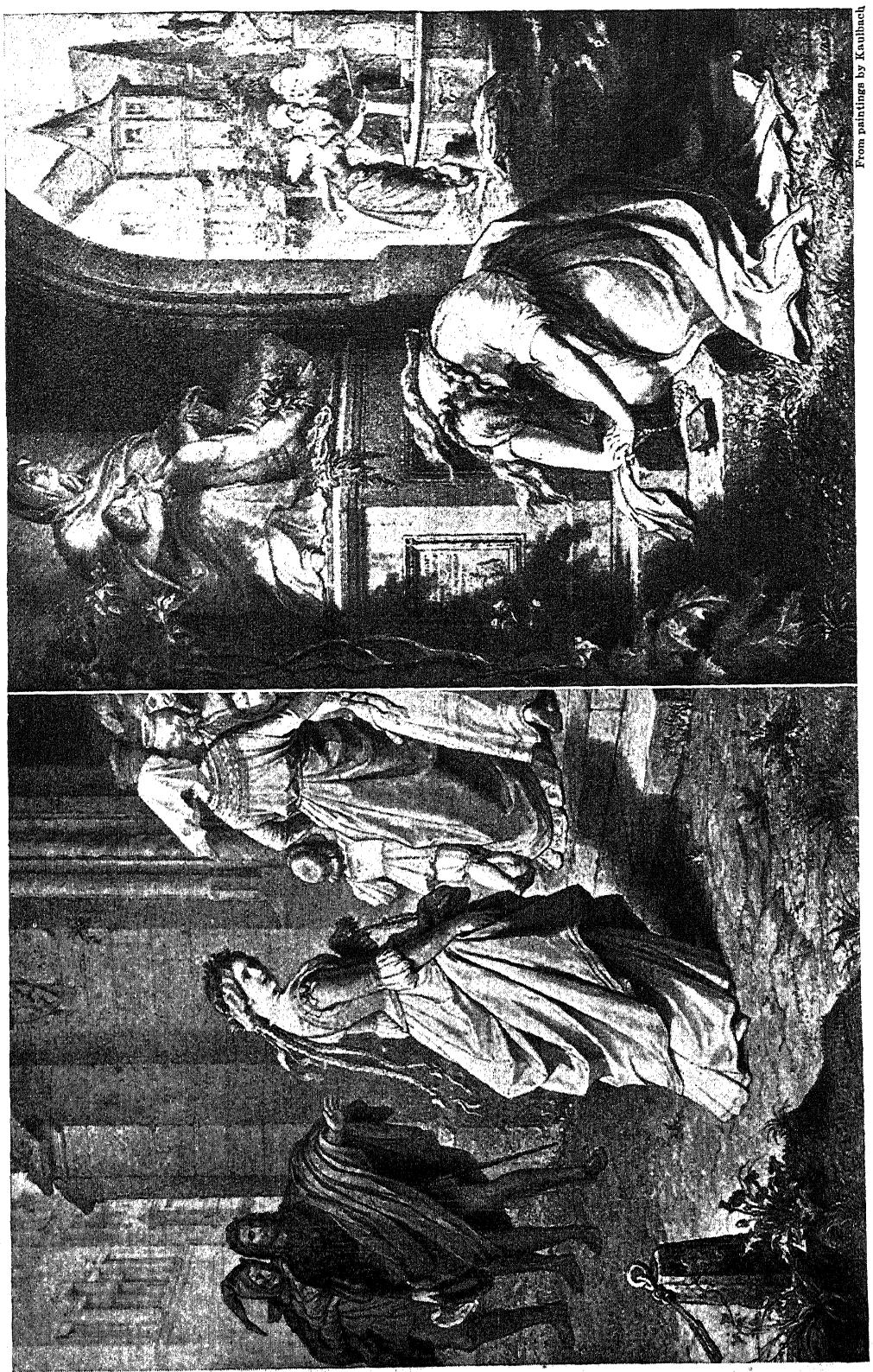
But the real Golden Age of German letters was yet to come, though it was near at hand; for Goethe and Schiller were born near the middle of the eighteenth century, and with them, German literature reached its great height. Few nations can present so perfect a type of the universal genius as was Goethe, and his influence is still felt in every literature of Europe. Contemporaneous with the great two, or slightly later, was a group of men distinguished in every field. Kant, Fichte, Schelling, Uhland, Jakob and Wilhelm Grimm—these were but a few of the names that made the era illustrious. As in France, Romanticism had its day, with Jean Paul Richter at the head of the movement, and though its excessive emphasis on idealism and fantastic imagination defeated its own purposes and brought about its decline, it had succeeded in modifying permanently the formal classicism.

In the period following that of Goethe, the most important figure in German literature was Heine, influential in many departments, but supreme in that of lyric poetry. The second quarter of the nineteenth century was a time of political and social unrest in Germany, and much of the literature produced, whether it was poetry, fiction, or drama, had some cause to advance. Since the establishment of the German Empire in 1871 as one of the great powers of Europe, literary development has been steady, and in any list of writers of high rank a number of Germans would have to be mentioned. To enumerate these is impossible here, but any treatment of German literature would be incomplete without the mention of the two great dramatists, Sudermann and Hauptmann.

The gigantic World War inspired a flood of patriotic writing, and out of Germany there came the poem which critics agree in calling the one really great expression of the war spirit—Lissauer's *Hymn of Hate*. Its author afterward apologized for its bitter feeling, and the German government disavowed its attitude, but from a literary point of view it far surpassed other poems called forth by the great struggle. The experience of the German people during the Armistice and under the republic naturally brought forth many works of a controversial nature, but creative literature was again being written within a decade after the war closed. The biographies of Emil Ludwig especially deserve mention.

Two Scenes from Faust. Mephistopheles tempting Faust with the beauty of Marguerite. At right, Marguerite in penitence before the statue of the Virgin.

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**Related Subjects.** The great leaders in German literature whose biographies are to be found in these volumes are listed at the close of the articles DRAMA; NOVEL; PHILOSOPHY; POETRY. The reader is also referred to the following articles:

|               |                |
|---------------|----------------|
| Faust         | Minnesingers   |
| Mastersingers | Nibelungenlied |

**GERMAN MEASLES.** See MEASLES.

**GERMAN POLICE DOG.** See POLICE DOG.

**GERMAN REFORMED CHURCH.** See REFORMED CHURCH.

**GERMAN SILVER.** Much of the so-called silverware used on the table consists of a yellowish metal that has been coated or plated with silver. When new, this ware has the appearance of solid silver, but the plate wears off by use, and the yellow metal is revealed. This metal is an alloy of copper, nickel, and zinc, in proportions of two parts copper to one part nickel and one part zinc, and is known on the market as *German silver*, or *nickel silver*.

The proportions of copper and nickel vary, to adapt the alloy to different purposes. When it is designed for making casts and candlesticks, a little lead is added. The addition of iron or steel makes the alloy harder, whiter, and more brittle. German silver is harder than silver and takes a good polish, but it is easily tarnished. Vinegar and strong solutions containing salt form poisonous compounds with it, and tableware from which the silver has been worn away should not be used with such liquids or with fruit. See NICKEL; ALLOY.

**Derivation.** The name *German silver* was applied to this alloy because it was first made in the town of Hildburghausen, Germany.

**GERMAN SOUTHWEST AFRICA,** a great territory belonging to Germany until the second year of the World War (1915). It is now officially Southwest Africa (which see).

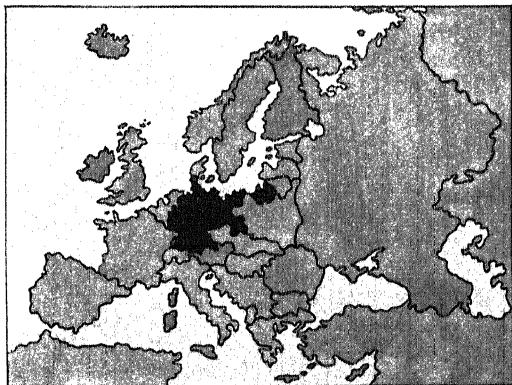
**GERMANTOWN, BATTLE OF.** See REVOLUTIONARY WAR IN AMERICA.



**G**ERMANY, known until November 9, 1918, as the GERMAN EMPIRE, and recognized as the greatest monarchy in the world, became on that day a republic, following the abdication of the emperor. This historic incident was the final event in the existence of the empire; two days later, a new republican government brought hostilities to an end by requesting an armistice, and terminated more than four years of the most awful destruction of human life and property in all history.

On the ruins of the empire the Germans began the reconstruction of their new nation, the German Republic (Deutsches Reich). Restoration of peace did not end trouble in the unhappy country; it was yet to experience trials which threatened its existence. It was beset with conspiracies to effect the return of monarchical government, communistic upheavals, and hunger revolts as a result of nearly five years of blockade. Its monetary system was practically destroyed, for the value of the mark, the unit of the system, reached so low a point that a trillion paper marks, formerly worth \$238,000,000,000, could be purchased for about twenty-four cents in United States or Canadian paper currency, or about one shilling English money.

The peace terms imposed by its former enemies put upon the people a tremendous burden of debt, which will require many years to liquidate. Any one of the disastrous aftermaths of war might have destroyed the best-

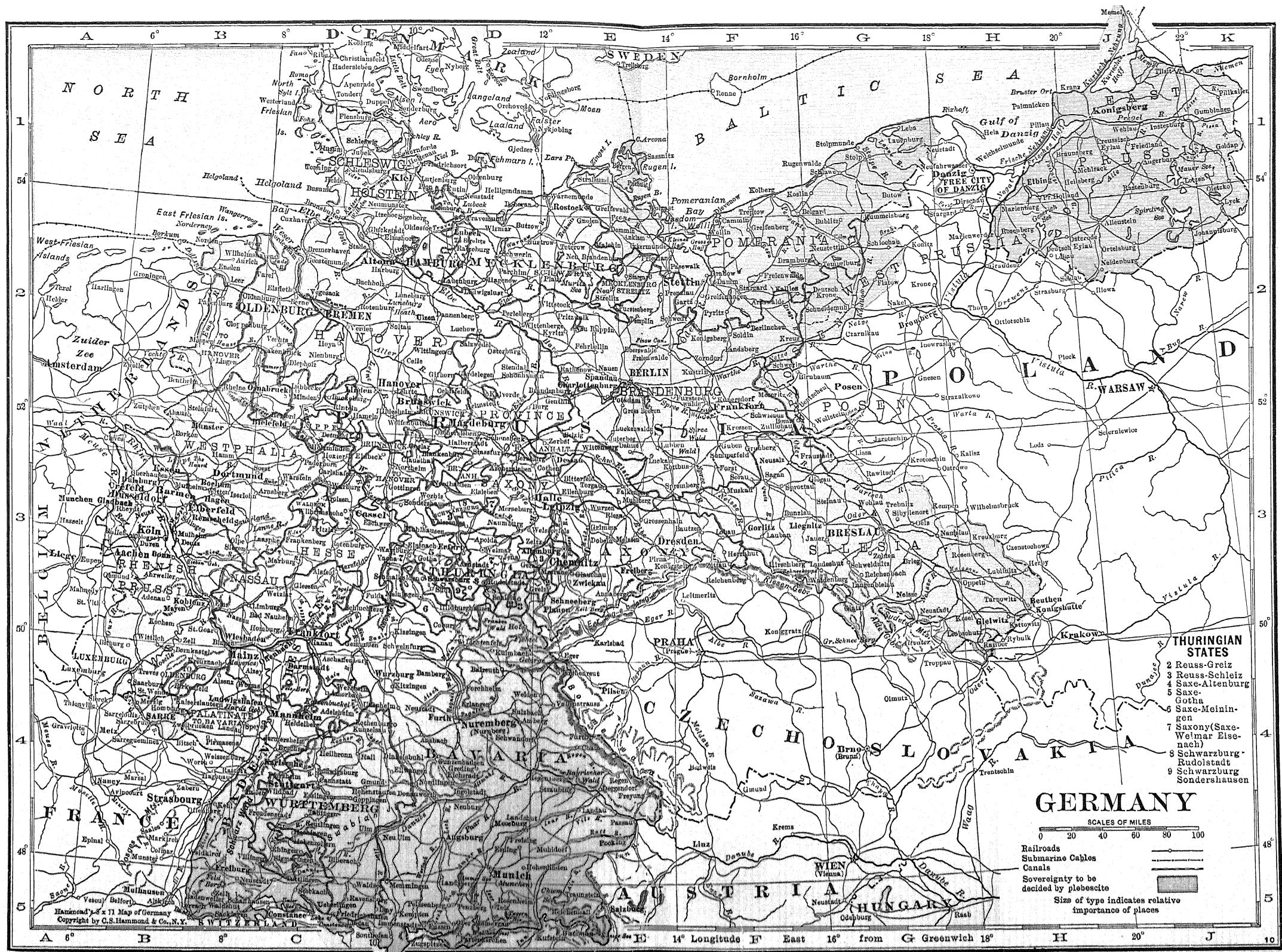


LOCATION MAP

intended government, but the wisdom of the men in control of Germany's destinies, especially President Friedrich Ebert, who showed high qualities of statesmanship, overcame

# GERMANY

|                                 |     |                           |     |                                    |     |                                    |     |
|---------------------------------|-----|---------------------------|-----|------------------------------------|-----|------------------------------------|-----|
| Aachen, 145,748                 | B 3 | Cammin.                   | F 2 | Freiberg ( <i>Saxony</i> ), 33,020 | E 3 | Hildburghausen                     | D 3 |
| Adelsheim, 13,388               | C 4 | Cannstatt.                | C 4 | Freiburg ( <i>Baden</i> ), 88,136  | C 4 | Hildesheim, 53,503.                | C 2 |
| Adenau, 1,750                   | B 3 | Carlshafen.               | C 3 | Freienwalde.                       | E 2 | Hirschberg, 21,314.                | F 3 |
| Ahaus, 4,000                    | B 2 | Cassel, 162,695           | C 3 | Freienwalde.                       | F 2 | Hof, 39,769                        | D 3 |
| Ahrweiler, 5,000                | B 3 | Celle, 23,555             | D 2 | Freising, 15,656.                  | D 4 | Hohenlanden                        | E 4 |
| Aisch River.                    | D 4 | Cham, 4,200.              | E 4 | Freudenstadt.                      | C 4 | Hohenstaufen                       | C 4 |
| Alde Gebirge (mts.)             | G 3 | Charlottenburg, 327,433.  | E 2 | Friedland ( <i>Mecklenburg</i> -   |     | Hohenzollern.                      | C 4 |
| Ailenstein, 34,731              | J 2 | Chemnitz, 307,074.        | E 3 | Strelitz).                         | E 2 | Holtenau.                          | D 1 |
| Alle River.                     | J 1 | Chiem See (lake).         | E 5 | Friedland ( <i>East Prussia</i> )  | J 1 | Holzminden, 10,164                 | C 3 |
| Aller River.                    | C 2 | Clausthal.                | D 3 | Friedrichshafen, 10,259.           | C 5 | Hombourg                           | B 4 |
| Alsenz.                         | B 4 | Cleves, 17,757.           | B 3 | Friedrichsort.                     | D 1 | Homburg, 14,956.                   | C 3 |
| Alsfield, 4,500                 | C 3 | Cloppenburg, 3,000.       | B 2 | Friedrich Wilhelm Canal            | F 2 | Hoxter.                            | C 3 |
| Altburg, 37,289.                | E 3 | Coblenz (Koblenz) 56,108. | B 3 | Frische Nehrung (pen-              |     | Hoya.                              | C 2 |
| Altmühl River                   | D 4 | Coburg, 23,679.           | D 3 | insula).                           | H 1 | Hunte River.                       | C 2 |
| Altona, 168,729.                | C 2 | Cologne (Köln) 643,899.   | B 3 | Frisches Haff (bay).               | H 1 | Husum.                             | C 1 |
| Alzey, 7,000.                   | C 4 | Constance, Lake of.       | E 5 | Fritzlar.                          | C 3 | Illet River.                       | D 4 |
| Alz River.                      | E 4 | Cothen, 22,881.           | E 3 | Fulda, 24,277.                     | C 3 | Ingolstadt, 26,091.                | D 4 |
| Amberg, 26,009.                 | D 4 | Crefeld, 125,351.         | B 3 | Fulda River.                       | C 3 | Inn River.                         | D 5 |
| Ammer See (lake).               | D 4 | Cuxhaven, 15,204.         | C 2 | Furstenberg.                       | E 2 | Insterburg, 39,538.                | J 1 |
| Amorbach, 2,500.                | C 4 | Dahme.                    | E 3 | Fursterwalde, 21,919.              | F 2 | Insta River.                       | K 1 |
| Amper River                     | D 4 | Damm.                     | F 2 | Furt, 67,993.                      | D 4 | Isar River.                        | D 5 |
| Angerapp River.                 | K 1 | Dannenberg.               | D 2 | Fussen.                            | D 5 | Iserlohn, 29,345.                  | B 3 |
| Angerberg, 5,000.               | J 1 | Danube River.             | D 4 | Gardelegen.                        | D 2 | Itzehoe, 18,626.                   | C 2 |
| Anhalt (state), 331,258.        | E 2 | Danzig, Gulf of.          | H 1 | Gartz.                             | F 2 | Jade Bay.                          | C 2 |
| Anklam, 14,355.                 | E 2 | Darmstadt, 83,119.        | C 4 | Geestemunde, 24,595.               | C 2 | Jagst River.                       | C 4 |
| Annaberg, 17,289.               | E 3 | Dars Point.               | E 1 | Gemund.                            | B 3 | Jauer, 11,547.                     | G 3 |
| Ansbach, 20,608.                | D 4 | Demmin, 12,102.           | E 2 | Gemunden.                          | C 3 | Jena, 47,662.                      | D 3 |
| Apolda, 21,191.                 | D 3 | Dessau, 57,889.           | E 3 | Genthin.                           | E 2 | Jever.                             | B 2 |
| Arcona, Cape.                   | E 1 | Detmold, 15,245.          | C 3 | Gera, 74,328.                      | D 3 | Johannisburg.                      | K 2 |
| Arnsberg, 11,181.               | C 3 | Deutsch Eylau.            | H 2 | Germersheim.                       | C 4 | Jubek.                             | C 1 |
| Arnstadt, 19,371.               | D 3 | Deutsch Krone.            | G 2 | Geserich See (lake).               | H 2 | Julich.                            | B 3 |
| Arnswalde, 9,000.               | F 2 | Deutz.                    | B 3 | Giesen, 32,915.                    | C 3 | Juterbog.                          | E 2 |
| Arolsen, 3,000.                 | C 3 | Diemel River.             | C 3 | Gifhorn.                           | D 2 | Kaiserslautern, 56,089.            | B 4 |
| Aschaffenburg, 32,199.          | C 4 | Diepholz.                 | C 2 | Gladbach.                          | B 3 | Kaiser Wilhelm Canal.              | C 1 |
| Aschersleben, 27,550.           | D 3 | Dievenow.                 | F 1 | Glatz, 14,949.                     | G 3 | Kalvorde.                          | D 2 |
| Augsburg, 154,555.              | D 4 | Dinkelsbuhl.              | D 4 | Glauchau, 22,947.                  | E 3 | Karlsruhe, 137,577.                | C 4 |
| Aurich, 7,000.                  | B 2 | Dobeln, 18,496.           | E 3 | Gleiwitz, 68,425.                  | H 3 | Katzenbuckel (mt.).                | C 4 |
| Baden, 25,144                   | C 4 | Doberan.                  | D 1 | Glogau, 25,457.                    | G 3 | Kehl.                              | B 4 |
| Baden (state), 2,208,503.       | C 4 | Dollant (bay).            | B 2 | Glückstadt.                        | C 2 | Keil Berg (mt.).                   | E 3 |
| Badenweiler.                    | B 5 | Donauwörth.               | D 4 | Gmund, 20,186.                     | C 4 | Kempten, 20,490.                   | D 5 |
| Bad Nauheim.                    | C 3 | Dortmund, 296,872.        | B 3 | Gnoien.                            | E 2 | Kiel, 206,361.                     | C 1 |
| Baireuth, 33,128.               | D 4 | Drago River.              | F 2 | Goppingen, 21,613.                 | C 4 | Kiel Bay.                          | D 1 |
| Baltic Sea.                     | G 1 | Dresden, 534,854.         | E 3 | Gorlitz, 80,613.                   | F 3 | Kinzig River.                      | C 3 |
| Bamberg, 49,179.                | D 4 | Drummer (lake).           | C 2 | Goslar, 20,323.                    | D 3 | Kissingen.                         | D 3 |
| Barmen, 156,326.                | B 3 | Duisburg, 243,686.        | B 3 | Gotha, 39,973.                     | D 3 | Kitzingen.                         | D 4 |
| Bartsch River.                  | G 3 | Duren, 34,126.            | B 3 | Göttingen, 40,359.                 | D 3 | Kleines Haff (bay).                | F 2 |
| Bautzen, 34,342.                | F 3 | Dusseldorf, 409,614.      | B 3 | Grabow.                            | F 2 | Koblenz (Coblenz) 56,108.          | B 3 |
| Bavaria (state), 3,746,063.     | D 4 | East Friesian Islands.    | B 2 | Great Schnee Berg (mt.).           | G 3 | Kochem.                            | B 3 |
| Bayrischer Wald (mts.).         | E 4 | East Prussia (province).  |     | Greding.                           | D 4 | Kocker River.                      | C 4 |
| Bayrischer Wald (mts.).         | E 4 | 2,229,290.                | J 1 | Grefenberg.                        | F 2 | Kolberg, 29,166.                   | F 1 |
| Belgard, 10,406.                | G 1 | Eberswalde, 27,082.       | E 2 | Grefenhagen.                       | F 2 | Köln (Cologne) 643,899.            | B 3 |
| Elzbg.                          | E 2 | Ebingen, 11,262.          | C 4 | Grefswald, 33,480.                 | E 1 | Königsberg ( <i>Brandenburg</i> ). | F 2 |
| Bentheim.                       | B 2 | Eckernförde.              | C 1 | Greiz, 20,291.                     | E 3 | Königsberg ( <i>Prussia</i> ).     | F 2 |
| Bergen.                         | E 1 | Eder River.               | C 3 | Grimma, 10,569.                    | E 3 | Königsberg (Prussia).              | I 1 |
| Berlin (capital), 1,902,509.    | E 2 | Eichstadt.                | D 4 | Gross Beeren.                      | E 2 | 264,502.                           | E 5 |
| Berlinchen.                     | F 2 | Eider River.              | C 1 | Grosshain, 12,465.                 | E 3 | Königs See (lake).                 | E 5 |
| Berne.                          | C 2 | Eilenburg, 17,718.        | E 3 | Grosses Haff (bay).                | F 2 | Königstein.                        | F 3 |
| Bernkastel.                     | B 4 | Einbeck.                  | C 3 | Grunberg, 22,269.                  | F 3 | Koslin, 27,307.                    | F 1 |
| Beuthen, 71,187.                | H 3 | Eisenach, 39,306.         | D 3 | Guben, 38,419.                     | F 3 | Kottbus, 49,042.                   | F 3 |
| Bielefeld, 79,049.              | C 2 | Eisleben, 22,645.         | D 3 | Gumbinnen, 17,549.                 | K 1 | Kreuz.                             | F 2 |
| Bingen.                         | B 3 | Elberfeld, 157,342.       | B 3 | Gunzenhausen.                      | D 4 | Kreuzburg, 11,426.                 | H 3 |
| Birkenfeld.                     | B 4 | Elbe River.               | C 2 | Gustrow, 18,744.                   | E 2 | Kreuznach, 23,875.                 | B 4 |
| Bitterfeld, 16,538              | E 3 | Elbing, 68,043.           | H 1 | Haase River.                       | B 2 | Kudow River.                       | G 2 |
| Blankenburg, 11,459.            | D 3 | Ellwangen.                | D 4 | Hagen, 93,310.                     | B 3 | Kulmbach, 10,424.                  | D 3 |
| Bochum, 142,760.                | B 3 | Elmshorn, 13,887.         | C 2 | Hagenow.                           | D 2 | Kunersdorf.                        | F 2 |
| Bohmert Wald (mts.).            | E 4 | Elsfleth.                 | C 2 | Halberstadt, 47,015.               | D 3 | Kunzelsau.                         | C 4 |
| Bomst.                          | F 2 | Emden, 24,898.            | B 2 | Hall.                              | C 4 | Kurische Nehrung (pen-             |     |
| Bonn, 91,410.                   | B 3 | Ems.                      | B 3 | Halle.                             | E 3 | insula).                           | J 1 |
| Borken.                         | B 3 | Ems River.                | B 2 | Hamburg, 996,645.                  | D 2 | Kurisches Haff (bay).              | J 1 |
| Borkum (island).                | B 2 | Enz River.                | C 4 | Hameln, 23,766.                    | C 2 | Kustrin, 18,625.                   | F 2 |
| Brahe River.                    | G 2 | Erding.                   | D 4 | Hamm, 45,499.                      | B 3 | Kyritz.                            | E 2 |
| Brandenburg, 53,348.            | E 2 | Erfurt, 130,136.          | D 3 | Hanau, 36,843.                     | C 3 | Laasphe.                           | C 3 |
| Brandenburg (state), 4,346,888. | E 2 | Erlangen, 23,569.         | D 4 | Hanover, 313,837.                  | D 2 | Lahn River.                        | C 3 |
| Braunsberg, 13,588.             | E 2 | Erzgebirge (mts.).        | E 3 | Hanover (district).                |     | Landau, 14,024.                    | B 4 |
| Bremen, 258,812.                | C 2 | Eschwege, 12,276.         | C 3 | Hanover (district).                |     | Landau an der Isar.                | E 4 |
| Bremervörden, 22,249.           | C 2 | Essen.                    | B 3 | Heide, 10,146.                     | C 1 | Landeshut, 12,024.                 | G 3 |
| Breslau, 531,662.               | G 3 | Esslingen, 38,125.        | C 4 | Heidelberg, 59,824.                | C 4 | Landsberg (Bavaria).               | D 4 |
| Brieg, 26,348.                  | G 3 | Eutin.                    | D 1 | Heilbronn, 44,145.                 | C 4 | Landsberg an der                   |     |
| Bruchsal, 15,453.               | C 4 | Falkenberg.               | E 3 | Heiligenstadt.                     | D 1 | Warthe, 39,987.                    | F 2 |
| Brunsbüttel.                    | C 2 | Fehmarn Island.           | D 1 | Heide, 10,146.                     | C 1 | Landshut, 25,335.                  | D 4 |
| Brunswick (state), 480,599.     | D 2 | Fehrbellin.               | E 2 | Herford, 35,115.                   | C 2 | Langenbielau, 15,677.              | G 3 |
| Brunswick (cape).               | H 1 | Feld Berg (mt.).          | B 5 | Hersfeld.                          | C 3 | Lapow River.                       | G 1 |
| Buchholz.                       | C 2 | Fels Berg (mt.).          | C 4 | Heilgendorf.                       | D 1 | Lauban, 14,456.                    | F 3 |
| Buckeburg.                      | C 2 | Felsberg.                 | D 3 | Heilsberg.                         | J 1 | Lauenburg (Pomerania).             |     |
| Bunzlau, 15,977.                | F 3 | Frankenwald (forest).     | D 2 | Helgoland (island).                | B 1 | 14,990.                            | G 1 |
| Burg.                           | E 2 | Frankfurt, 435,221.       | C 3 | Helgoland Bay.                     | C 1 | Lauenburg (Schleswig-Holstein).    | D 2 |
| Busum.                          | C 1 | Frankfort.                | F 2 | Hesse Nassau (province).           | C 3 | Leba.                              | G 1 |
| Butzow.                         | D 2 | Frankfort.                | F 2 | Hesse (state).                     | C 3 | Lech River.                        | D 4 |
|                                 |     |                           |     |                                    |     | Leer.                              | B 2 |
|                                 |     |                           |     |                                    |     | Lehrte.                            | D 2 |
|                                 |     |                           |     |                                    |     | Leine River.                       | C 2 |
|                                 |     |                           |     |                                    |     | Lipzig, 608,273.                   | E 3 |



# GERMANY *Continued*

|   |     |  |     |                                   |     |  |     |
|---|-----|--|-----|-----------------------------------|-----|--|-----|
| Lenne River.                            | C 3 | Nienburg                                 | C 2 | Riesa, 14,790                     | E 3 | Tauber River                             | C 4 |
| Leobschutz, 11,915.                     | G 3 | Norden, 10,259                           | B 2 | Rinteln                           | C 2 | Tegern See (lake)                        | D 5 |
| Lichtenfels.                            | D 3 | Nordenham                                | C 2 | Roer (river)                      | B 3 | Tempelburg.                              | G 2 |
| Liegnitz, 70,365                        | F 3 | Norderney (island)                       | B 2 | Rosenberg ( <i>Prussia</i> )      | H 2 | Templin                                  | E 2 |
| Limburg an der Lahn, 11,902.            | .   | Nordhausen, 33,243                       | D 3 | Rosenheim, 17,494..               | E 5 | Teterow                                  | E 2 |
| Lindau                                  | C 3 | Northeim.                                | D 3 | Rostock, 67,120                   | E 1 | Teutoburger Wald (mts.)                  | B 2 |
| Linden, 83,045.                         | C 5 | North Friesian Islands.                  | C 1 | Rotenburg ( <i>Hesse-Nassau</i> ) | C 3 | Thuringia (state)                        | D 3 |
| Lingen                                  | B 2 | North Sea.                               | A 1 | sau) ..                           | C 3 | Tilsit, 45,309                           | J 1 |
| Lippe (state), 154,318                  | C 2 | Nuremberg (Nürnberg).                    | D 4 | Rotenburg ( <i>Hanover</i> )      | C 2 | Tonnung                                  | C 1 |
| Lippe River                             | B 3 | Nurnberg (Nuremberg).                    | .   | Rott River.                       | E 4 | Torgau, 13,432                           | E 3 |
| Lobau, 11,771                           | F 3 | 355,223                                  | .   | Rudolstadt, 12,231                | D 3 | Travemunde                               | D 2 |
| Lorrach, 14,702..                       | B 5 | Ober Ammergau                            | D 5 | Rugen Bay                         | E 1 | Trave River                              | D 2 |
| Lotzen                                  | J 1 | Oberhausen, 99,082..                     | B 3 | Rugen Island                      | E 1 | Treptow                                  | F 1 |
| Lubbecke                                | C 2 | Obra River                               | F 2 | Rugenwalde                        | G 1 | Treves, 53,048                           | C 4 |
| Lubben.                                 | E 3 | Oder River                               | F 2 | Ruhr River                        | C 3 | Tubingen, 19,969                         | C 4 |
| Lubeck, 112,170                         | D 2 | Oebisfelde.                              | D 2 | Saale River                       | C 3 | Tuttlingen, 15,807                       | C 5 |
| Lubeck Bay.                             | D 1 | Offenbach, 76,809                        | C 4 | Saarburg.                         | B 4 | Uckermunde.                              | E 2 |
| Luchow                                  | D 2 | Offenburg, 16,200..                      | B 4 | Sagan, 15,321                     | F 3 | Uffenheim.                               | D 4 |
| Luckau.                                 | E 3 | Oldenburg ( <i>Oldenburg</i> ).          | B 2 | Salzach River                     | E 5 | Ulm, 55,967                              | C 4 |
| Luckenwalde, 23,164                     | E 2 | 32,646.                                  | .   | Salzwedel, 14,574                 | D 2 | Ulzen, 11,564.                           | D 2 |
| Ludwigsburg, 23,521..                   | C 4 | Oldenburg ( <i>Schleswig-Holstein</i> ). | D 1 | Sankt Goar                        | B 3 | Unter See (lake)                         | C 5 |
| Ludwigsburg, 92,002                     | C 4 | 95,998.                                  | .   | Sankt Wendel                      | B 4 | Usedom Island                            | F 2 |
| Ludwigslust.                            | D 2 | Oldenburg (state), 517,765..             | C 2 | Sarre (plebiscite district),      | .   | Vacha.                                   | D 3 |
| Luneburg, 26,684..                      | D 2 | Oldesloe.                                | D 2 | 95.                               | B 4 | Varel.                                   | C 2 |
| Lunenburg Heath.                        | D 1 | Olpe.                                    | B 3 | Sassnitz.                         | E 1 | Vechta.                                  | C 2 |
| Lutjenburg                              | D 1 | Oppeln.                                  | B 3 | Sauerland (region).               | B 3 | Vege sack.                               | C 2 |
| Lyck, 14,030                            | K 2 | Oppersleben, 35,474                      | H 3 | Saxony, Province of,              | .   | Verden.                                  | C 2 |
| Magdeburg, 285,711..                    | D 2 | Oschersleben, 11,633..                   | D 2 | 3,129,193                         | D 3 | Villingen, 12,411                        | C 4 |
| Main River.                             | C 4 | Osnabrück, 85,705                        | C 2 | Saxony (state), 4,663,298         | E 3 | Vilm See (lake).                         | G 2 |
| Mainz (Mayence), 108,513..              | C 4 | Osterburg                                | D 2 | Schlawa.                          | G 1 | Vils River.                              | E 4 |
| Malapane River.                         | H 3 | Oste River                               | C 2 | Schleiz.                          | D 3 | Vogels Berg (mt.).                       | C 3 |
| Malchin.                                | E 2 | Osterode an der Dre-                     | .   | Schleswig, 17,024                 | C 1 | Walchen See (lake).                      | D 5 |
| Mannheim, 231,425                       | C 4 | wenz, 15,298.                            | H 2 | Schleswig-Holstein (prov-         | .   | Wald, 26,006                             | F 3 |
| Marburg, 22,534                         | C 3 | Ottensen.                                | C 2 | ince), 1,626,465..                | C 1 | Waldeck (state), 66,432                  | C 3 |
| Marienburg, 16,061..                    | H 2 | Our River.                               | B 3 | Schley River.                     | D 1 | Waldenburg, 37,142..                     | G 3 |
| Mauer See (lake).                       | J 1 | Paar River.                              | D 4 | Schluchtern.                      | C 3 | Walkkirch.                               | B 4 |
| Mayen, 13,249..                         | B 3 | Paderborn, 35,115..                      | C 3 | Schmalkalden.                     | D 3 | Wangerroog (island).                     | B 2 |
| Mayene (Mainz), 108,513..               | C 4 | Palainate (district),                    | .   | Schneeeberg.                      | E 3 | Wapper River.                            | B 3 |
| Mecklenburg-Strelitz (state), 106,394.. | E 2 | 957,321                                  | B 4 | Schneidemuhl, 32,765..            | G 2 | Warburg.                                 | C 3 |
| Meerne, 22,082..                        | E 3 | Palmnicken                               | H 1 | Schonebeck, 18,367..              | D 2 | Warnemünde.                              | E 1 |
| Mehlsack.                               | J 1 | Parchim, 11,327..                        | D 2 | Schonhausen.                      | D 2 | Warnow River.                            | D 2 |
| Meiningen, 16,848..                     | D 3 | Pasewalk, 11,107..                       | F 2 | Schwandorf.                       | D 4 | Warstein.                                | C 3 |
| Meissen, 37,463..                       | E 3 | Passage River.                           | H 1 | Schwarzburg (province),           | .   | Wartburg.                                | D 3 |
| Memel or Niemen River.                  | J 1 | Passau, 20,373..                         | E 4 | 93,174..                          | D 3 | Wartlhe River.                           | F 2 |
| Memmingen, 12,699..                     | D 5 | Peene River.                             | E 2 | Schwarze Elster River.            | E 3 | Wehlau.                                  | J 1 |
| Meppen.                                 | B 2 | Pegnitz River.                           | D 4 | Schwarz Wald (mts.).              | C 4 | Weiden, 17,702..                         | D 4 |
| Mersburg, 22,850..                      | D 3 | Perleberg.                               | D 2 | Schweidt.                         | F 2 | Weimar, 37,848..                         | D 3 |
| Merzig.                                 | B 4 | Persante River.                          | F 2 | Schweidnitz, 26,057..             | G 3 | Weissenburg.                             | B 4 |
| Minden, 32,220..                        | C 2 | Pforzheim, 34,155..                      | C 4 | Schweinfurt, 27,399..             | D 3 | Weissenfelts, 33,617..                   | E 3 |
| Moosburg.                               | D 4 | Pillau.                                  | H 1 | Schwerin, 44,969..                | D 2 | Weissensee.                              | D 3 |
| Moselle River.                          | B 4 | Pilkallen.                               | K 1 | Schwerin an der Warthe.           | E 2 | Werthe River.                            | C 2 |
| Muhlburg.                               | E 3 | Pirmasens.                               | B 4 | Schwerin (state).                 | E 2 | Wertach River.                           | D 4 |
| Muhlhausen, 34,116..                    | D 3 | Pirna, 19,060..                          | E 3 | Segeberg.                         | D 2 | Wertheim.                                | C 4 |
| Mulde River.                            | E 3 | Pissa River.                             | K 1 | Sieben Gebirge (mts.).            | B 3 | Wesel, 22,153..                          | B 3 |
| Mulheim am Rhine.                       | B 3 | Plau.                                    | E 2 | Siegen, 28,886..                  | B 3 | Weser River.                             | C 2 |
| Mulheim an der Ruhr, 127,642..          | B 3 | Plauen, 105,639..                        | E 3 | Sieg River.                       | B 3 | Westerland.                              | C 1 |
| Munchen (Munich), 645,654..             | D 4 | Pleisse River.                           | E 3 | Sigmaringen.                      | C 4 | Westphalia (province), 4,488,115..       | B 3 |
| Munchen (München), 645,654..            | D 4 | Ploen.                                   | D 1 | Silesia (region).                 | G 3 | West Prussia-Posen (province), 326,881.. | G 2 |
| Munster, 100,729..                      | B 3 | Pomerania (province), 1,787,193..        | F 2 | Sinn River.                       | C 3 | Wetter River.                            | C 3 |
| Muritz See (lake).                      | E 2 | Pomeranian Bay.                          | F 1 | Soldin.                           | I 2 | Wetzlar.                                 | C 3 |
| Muskau.                                 | F 3 | Potsdam, 59,614..                        | E 2 | Solingen, 49,316..                | B 3 | Wiesbaden, 97,786..                      | C 3 |
| Nassau.                                 | B 3 | Pregel River.                            | J 1 | Soltau.                           | C 2 | Wildbad.                                 | C 4 |
| Nauen.                                  | E 2 | Prenzlau, 19,845..                       | F 2 | Sommerfeld, 10,055..              | P 3 | Wilhelmshaven, 38,976..                  | C 2 |
| Naumburg an der Saale, 28,275..         | D 3 | Preussisch Eylau.                        | J 1 | Sondershausen, 13,322..           | D 3 | Wilhelmshohe.                            | C 3 |
| Neckar River.                           | C 4 | Pritzwalk.                               | E 2 | Sorau, 15,862..                   | I 3 | Wismar, 25,127..                         | D 2 |
| Neisse, 27,922..                        | G 3 | Prussian Holland.                        | H 1 | Spandau, 96,300..                 | I 2 | Witten, 37,566..                         | B 3 |
| Neisse River.                           | F 3 | Putbus.                                  | E 1 | Speyer, 23,577..                  | C 4 | Wittenberg, 22,563..                     | E 3 |
| Netze River.                            | F 2 | Pyritz.                                  | F 2 | Spiraling See (lake).             | J 2 | Wittenberge, 24,480..                    | E 2 |
| Neustadt (Sachsen-Holstein).            | D 1 | Quakenbrück.                             | C 2 | Spree River.                      | I 2 | Wittingen.                               | D 2 |
| Neustadt (Silesia), 15,847..            | G 3 | Quetus River.                            | F 3 | Spree Wald (forest).              | I 2 | Wittlich.                                | B 3 |
| Neustadt an der Aisch, 40,006..         | B 3 | Rathenow.                                | E 2 | Spremberg, 10,700..               | I 2 | Wittstock.                               | E 2 |
| Neustadt im Schwarzwald.                | C 5 | Ratibor, 36,935..                        | I 3 | Stadte, 10,442..                  | C 2 | Wolfenbuttel, 18,158..                   | D 2 |
| Neustettin, 13,455..                    | G 2 | Ratzburg.                                | D 2 | Stargard (Mecklenburg-Strelitz).  | E 2 | Wolgast.                                 | E 1 |
| Neumunster, 36,227..                    | C 1 | Ravensburg.                              | C 5 | Stargard (Pomerania), 29,134..    | F 2 | Wollin.                                  | F 2 |
| Neu Ruppin, 17,239..                    | E 2 | Recknitz River.                          | E 2 | Stassfurt, 16,395..               | D 3 | Wolin Island.                            | F 2 |
| Neusalz, 13,031..                       | F 3 | Rega River.                              | F 2 | Steinfurt.                        | B 2 | Worblis.                                 | D 3 |
| Neuss, 40,006..                         | B 3 | Regen River.                             | E 4 | Stendal, 28,950..                 | D 2 | Worms, 44,972..                          | C 4 |
| Neustadt (Schleswig-Holstein).          | D 1 | Regensburg, 52,765..                     | E 4 | Stettin, 233,255..                | F 2 | Wümme River.                             | C 2 |
| Neustadt (Silesia).                     | G 3 | Regnitz River.                           | D 4 | Stolp, 38,211..                   | G 1 | Wurzen, 17,230..                         | E 3 |
| Neustadt an der Aisch.                  | D 4 | Reichenbach, 15,074..                    | G 3 | Stolpe River.                     | G 1 | Zeitz, 32,670..                          | E 3 |
| Neustadt im Schwarzwald.                | C 5 | Remscheid, 73,904..                      | B 3 | Stolpmunde.                       | G 1 | Zell (Baden).                            | B 5 |
| Neustettin, 13,455..                    | G 2 | Rendsburg, 15,825..                      | C 1 | Stralsund, 37,025..               | E 1 | Zell (Rhenish Prussia).                  | B 3 |
| Neustettin, 13,455..                    | G 2 | Reutlingen, 29,091..                     | C 4 | Straubing, 22,603..               | E 4 | Zerbst, 18,556..                         | E 3 |
| Neu Ulm, 11,542..                       | D 4 | Rheine, 15,709..                         | B 2 | Stuttgart, 311,250..              | C 4 | Zingst Island.                           | E 1 |
| Nidda River.                            | C 3 | Rheine River.                            | B 3 | Sudetes Mountains.                | G 3 | Zittau, 34,190..                         | F 3 |
| Niemen or Memel River.                  | J 1 | Rhone Gebirge (mts.).                    | C 3 | Suhl, 14,605..                    | D 3 | Zorndorf.                                | F 2 |
|   |     |  |     | Tarnowitz, 14,399..               | H 3 | Zweibrücken, 14,153..                    | B 4 |
|   |     |  |     |                                   |     | Zwickau, 69,189..                        | E 3 |

crisis after crisis; in fewer than ten years, the republic had justified the hopes of its friends, and had in great degree reinstated its people in the friendly regard of the world.

**What Germany Comprises.** The German Empire was not a unit, with divisions merely for purposes of local government, as was Russia under the czars; nor was it, like the United States, a union of commonwealths of equal rank and with equal powers and privileges. It was made up of kingdoms, grand duchies, duchies, principalities, and free cities—twenty-six states in all. In the republic there are eighteen political divisions, or territories, called *lander*; these, with their areas and populations, are listed below. The Saar Valley, which was placed under foreign control for fifteen years by the victorious Allies, with its future to be determined by a plebiscite, is included in the list; it lies partly in Prussia and partly in Bavaria:

| DIVISION                                       | AREA    | POPULATION<br>(1925) |
|--|---------|----------------------|
| Prussia (excluding the Saar)                   | 112,628 | 38,054,172           |
| Bavaria (excluding the Saar) . . .             | 29,343  | 7,379,594            |
| Wurttemberg . . . . .                          | 7,532   | 2,579,453            |
| Baden . . . . .                                | 5,819   | 2,312,462            |
| Saxony . . . . .                               | 5,789   | 4,996,138            |
| Mecklenburg-Schwerin . . . . .                 | 5,069   | 674,411              |
| Thuringia . . . . .                            | 4,527   | 1,609,300            |
| Hesse . . . . .                                | 2,970   | 1,347,295            |
| Oldenburg . . . . .                            | 2,480   | 545,749              |
| Brunswick . . . . .                            | 1,418   | 501,675              |
| Mecklenburg-Strelitz . . . . .                 | 1,131   | 110,371              |
| Anhalt . . . . .                               | 888     | 151,485              |
| Lippe . . . . .                                | 469     | 163,577              |
| Waldeck . . . . .                              | 408     | 55,750               |
| Schaumburg-Lippe . . . . .                     | 131     | 48,044               |
| Hamburg . . . . .                              | 160     | 1,152,489            |
| Lübeck . . . . .                               | 115     | 127,971              |
| Bremen . . . . .                               | 99      | 338,846              |
| German Republic (excluding the Saar). . . . .  | 180,976 | 62,348,782           |
| Prussian Saar District . . . . .               | 574     | 671,748              |
| Saarpfalz . . . . .                            | 164     | 98,252               |
| Saar District (altogether) . . . . .           | 738     | 770,000              |
| German Republic (with Saar District) . . . . . | 181,714 | 63,118,782           |

**Territory Lost after the War.** Present-day Germany comprises 181,714 square miles, including the Saar district. As one of the penalties imposed following defeat, 27,572 square miles were ceded to other powers or placed under the control of the League of Nations, as follows:

|   | SO. MR. |
|---|---------|
| Alsace-Lorraine, ceded to France . . . . .  | 5,600   |
| District between Holland and Luxembourg,<br>ceded to Belgium . . . . .              | 382     |
| Parts of Silesia, Posen, and West Prussia,<br>ceded to Poland . . . . .             | 12,504  |
| Mouth of Memel River and Danzig and surrounding territory, internationalized, under |         |

|  |       |
|--|-------|
| League of Nations control . . . . .  | 1,026 |
| Basin of the Saar River, internationalized for fifteen years . . . . .                                     | 738   |
| Part of Schleswig, joined to Denmark in 1920 . . . . .   | 1,537 |
| Part of East Prussia and districts along North Vistula River, ceded to Poland and Czechoslovakia . . . . . | 5,785 |

These cessions relate only to territory originally a part of the German Empire. In addition, the country was deprived of all its vast colonial possessions, principally in Africa, where it had controlled German East Africa, German Southwest Africa, Kamerun, and Togoland, comprising a total area in that continent of 931,460 square miles. Before the war, the country, though irregular in form, was in one land mass; the Danzig area, called the "Danzig corridor," now separates East Prussia from the main part of the republic.

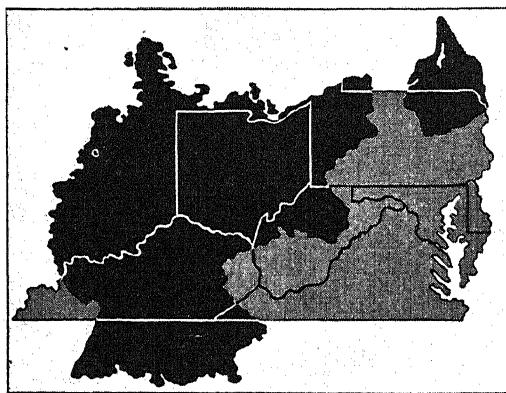
**The People.** The Germans, or as they call themselves, *Deutsche*, are Teutons—that is, they belong to that great division of the human race which includes the Scandinavians, the English, the Dutch, and a great many of the inhabitants of Canada and the United States. The typical German has fair hair and blue eyes, and is rather solidly built; but it is estimated that less than one-third of the inhabitants of the country are of this type, by far the greater number belonging to an intermediate brown-haired type.

Temperamentally, the Germans have certain very distinct characteristics. Perhaps the chief of these is thoroughness. Without the quickness of the French or the bulldog determination of the English, the German accomplishes results by a stolid perseverance which ignores all obstacles. "German stolidity" has become proverbial, but the term stolidity is by no means uncomplimentary, for no people have delved deeper and more effectively into philosophy, though some of it has proved baneful; no people have wrought out more painstaking and accurate scientific systems, or have produced literature, whether of the realistic or the imaginative type, of more importance. No country has given to the world more first-class composers of music.

All the inhabitants of the United States may be called, in a certain sense, Americans; all those of the Dominion, Canadians; but not all the inhabitants of the former empire were in this same sense Germans. These non-Germans were not immigrants who dwelt in the country without becoming a part of it, but were people living on their ancestral soil who spoke the language which their predecessors had spoken for centuries. Thus there were Poles in the provinces of Silesia and Posen; Danes in Schleswig-Holstein; French in Alsace-Lorraine; Czechs in Silesia—in all, a population of over 6,000,000 of non-German blood. The treaty of peace returned many of these partly alien

people to their original linguistic groups, on the basis of President Wilson's idea of the "self-determination of peoples."

Nor do all Germans in Germany speak exactly the same language or dialect. In the northern district, there is the so-called Low



COMPARATIVE AREAS

The area of the new Germany is 181,714 square miles. It is but little larger than the American states of Kentucky, Virginia, West Virginia, Pennsylvania, Maryland, Delaware, and Ohio, a group whose combined area is 167,218 square miles. Compared with the Canadian province of Alberta, Germany is over 50,000 square miles smaller.

German, or *Plattdutsch*, while in the highlands of the south is the so-called High German, with a few minor dialects. High German is the language of the schools and the great majority of the people, as well as the language of German literature.

The national census of 1925 was the second undertaken after the World War, the first having been a somewhat unofficial count in 1919; the 1925 enumeration will continue to be the basis of German statistics until the next republican census, in 1935. Under the empire, the population (1911) was 64,926,000; in 1919 it was reported as 59,857,000. The census of 1925 revealed a total population, on June 16 of that year, of 63,118,782.

In the territory ceded to its late enemies in the war, Germany lost about 6,500,000 people. The known German dead in the war numbered 1,611,104. When the war began in 1914, an estimate placed the population not much below 66,000,000.

The Germans have a much stronger tendency to emigrate than have the French, for example, and it is estimated that during the nineteenth century, no fewer than 6,000,000 people left their ancestral homes. By far the larger number went to the United States.

Before the World War, Germany had a density of 310.9 people to the square mile—considerably less than that of England, Belgium, or the Netherlands, and about ten times

that of the United States as a whole (which in 1919 was 31). The distribution of the inhabitants is very uneven, for one former kingdom of the country, Saxony, had about 800 to the square mile.

**Principal Cities.** Considerably more than half of the people live under urban conditions, that is, in communes of more than 2,000 inhabitants. There were in 1925 two cities each with over 1,000,000 people; eighteen each with a population greater than 250,000; twenty-five with over 100,000; and forty-seven with over 50,000. The chief cities, which receive detailed description in separate articles in these volumes, are Berlin, the capital; Hamburg, Leipzig, Lübeck, Munich, Dresden, Cologne, Frankfort-on-the-Main, and Bremen. Others are described below:

**Aix-la-Chapelle**, *eks lah shah pel'*, known officially as *Aachen* (*a'h ken*), is a city of Rhenish Prussia, forty-four miles southwest of Cologne. The place attracts many visitors because of the warm sulphur springs in and near the city, and several mineral springs having a wide reputation as a cure for rheumatism. The most important building of the city is the cathedral, the oldest portion of which was erected in 796 as the royal chapel. This is the traditional burial place of Charlemagne, who died in 814. The town hall, in the market place, occupies the site of Charlemagne's palace. Two celebrated treaties were signed in Aix-la-Chapelle, and a congress of the great powers was held there in 1818 (see *AIX-LA-CHAPELLE*, *CONGRESS OF*; *AIX-LA-CHAPELLE*, *TREATIES OF*). Population, 155,000.

**Altona**, *ahl' toh nah*, a commercial city of Prussia, on the Elbe River. It adjoins Hamburg, the two being virtually one city, and shares in the extensive commerce of the port. The name is derived from *all zu-nah*, meaning *all too near*; this term was applied by the burghers of Hamburg, in the sixteenth century, to the only inn in the neighborhood. Population, 185,000.

**Augsburg**, *owgs' boork*, in Bavaria, a famous free city of the Middle Ages, known as a center of trade between Germany and Italy and for its connection with the Augsburg Confession (which see). It has played an important part in the development of German art, and it is still an important commercial point, with a population of over 165,000. Augsburg occupies the site of a colony founded by the Emperor Augustus about 12 B.C.

**Baden**, *bah' den*, a famous watering place at the edge of the Black Forest, in the state of Baden. *Baden* means *bathe*, and is applied to so many other places in Germany that this watering place is often called *Baden-Baden*, for identification. The mineral springs, famed from early times, have temperatures varying from 117° to 154°, and attract visitors in large numbers. While more than 70,000 persons flock to Baden in some years, the resident population of the town is only 25,000.

**Barmen**, in Rhenish Prussia, is one of the most prosperous cities of Germany. It is famous for the manufacture of ribbon, in which it is one of the leading cities of the Continent. It is situated on the Wupper River, twenty-five miles northeast of Cologne; on the west it joins the town of Elberfeld. Barmen manu-



Photo: P & A

Berlin Cathedral at Night. Searchlights are focused on the building, to bring out the beautiful details of its architecture.

factures include scores of staples; the calico-printing establishments are noted for the superiority of the dye called Turkey red. Population, 187,000.

**Bayreuth**, *bi roit'*, a town of Bavaria, fifty-eight miles northeast of Nuremberg, possesses undying fame and interest because of its associations with the great composer Richard Wagner (which see). On the street named for him is the home of the musician, with his grave in the garden, but his most interesting memorial is the famous Wagner Theater, opened in 1876, and devoted entirely to the performance of his music dramas. Bayreuth also contains the graves of Franz Liszt and Jean Paul Richter, and a monument to the latter has been erected in the cemetery.

Bayrouth is a town of some importance as a manufacturing, railway, and trading center. Population, 35,000.

**Bingen**, *bing' en*, a town of Hesse which has attained a place in literature and in legend. Mrs. Caroline Norton's world-famous ballad has made the name a household word:

For I was born at Bingen, fair Bingen on the Rhine.  
The famous Mouse Tower of legend, which was built before the year 1000 and restored in 1856, now serves as a signal station for ships. See MOUSE TOWER.

Bingen is situated at the point where the Nahe joins the Rhine. The district is noted for the culture of the vine, and there is a large trade in wine. Population, 10,000.

**Bonn**, in Rhenish Prussia, is the birthplace of Beethoven and the home of an important modern German university. It is situated in a region noted for its beautiful scenery, on the left bank of the River Rhine, fifteen miles southeast of Cologne. As a commercial center, Bonn is not of first importance, but breweries and jute spinning and weaving afford employment for a considerable number of people. Population, 89,500.

**Breslau**, *bres' lou*, capital of the Prussian province of Silesia, is beautifully situated on both banks of the Oder River, 350 miles from its mouth and 202 miles southeast of Berlin. It is the chief industrial and commercial center of Southeastern Germany. The city is divided into an old and a new portion, the old retaining the characteristics of a medieval city, the new being a modern manufacturing town. The cathedral, built in the twelfth century, is an imposing structure containing very valuable art treasures and an altar of beaten silver. The flourishing university occupies a fine Gothic building overlooking the river. The trade of the city is very extensive, as it is situated close to large iron and coal fields and is a forwarding and receiving depot for the products of the surrounding territory. Population, 563,000.

**Brunswick**, *brunz' wik*, an irregularly built city dating from medieval days, capital of the state of the same name, is situated in a very fertile region on the Oker River. It is thirty-five miles southeast of Hanover by rail. The name is derived from old Latin words meaning the *village of Bruno*, Bruno being the ruler of the land in the latter part of the ninth century. The ancient ramparts have been converted into promenades and parks, but the great age of the city is clearly shown in many of its fine old buildings. It is now an important industrial center. Population, 146,600.

**Cassel**, *kahs' el*, a picturesque town, capital of the province of Hesse-Nassau, is situated on both banks

of the Fulda River, ninety-one miles northeast of Frankfort-on-the-Main. The city possesses one of the finest collections of pictures in Europe. It is also an important musical center, and has a fine opera house, built by Jerome Bonaparte. The commerce is extensive, the chief articles of manufacture being engines, mathematical and scientific instruments, porcelain, and chemicals. There are large lithographing plants, where some of the world's finest lithography is produced. Population, 171,000.

**Chemnitz**, *hem' nitz*, one of the chief commercial and industrial cities, is in Saxony, on the Chemnitz River, thirty-eight miles west-southwest of Dresden. In this "Saxon Manchester," as the town is called, the greatest industries include the manufacture of machinery, in which over 20,000 men are employed, and the making of textile fabrics, chiefly cottons. The city sends a large part of its calicos, ginghams, and other printed goods to the United States. Chemnitz had a rapid growth in the early years of the nineteenth century. Population, 333,000.

**Coblenz**, *ko' blents*, capital of the Rhineland, is located at the confluence of the Rhine and the Moselle rivers. It is a commercial and manufacturing center, and the principal products are Moselle wine, ships, machinery, and pianos. After the Armistice, the fortress of Ehrenbreitstein, on the opposite side of the river, was occupied by American soldiers, who remained in the area until 1923. Population, 58,000.

**Dortmund**, *dawrt' moon*, an important mining city in Westphalia, is situated near the River Ems, seventy-three miles northeast of Cologne. Although an ancient city, established before the year 900, the place has had a rapid growth only within recent years. This was due to railway development and the opening up of mines. The iron industry is of great importance, and there are very large plants. Locomotives, cars, and all kinds of heavy machinery are manufactured. Dortmund was a flourishing member of the Hanseatic League (which see), but steadily declined from the fifteenth century until after the Franco-German War (1870-1871), when it developed rapidly. Population, 128,000.

**Düsseldorf**, in Rhenish Prussia, is a famous art, educational, and industrial center, and one of the most beautiful cities of the republic. The town dates from about 1250. It is situated at the confluence of the rivers Düssel and Rhine, twenty-two miles northwest of Cologne. In some parts the streets are crooked and narrow, but the more modern portions are well planned, with fine buildings. Within recent years, the city has become industrially prominent, iron and steel manufactures having been developed with great rapidity. The Düsseldorf school of painting, an outgrowth of the Academy of Art founded in 1767 by the Elector Karl Theodor, is important. Population, 431,000.

**Elberfeld**, *el bur feld'*, in Rhenish Prussia, is an important commercial town forming practically one city with Barmen, although they are municipally separate. It is situated on both banks of the River Wupper, about fifteen miles northeast of Düsseldorf. Elberfeld has long been a noted educational center, and it is only within recent years that it has assumed commercial importance. It is now a center of cotton, wool, velvet, and silk industries, and produces great quantities of chemicals and dyestuffs. Elberfeld owes its original industrial growth to Napoleon's continental system (which see), which prohibited all dealings with the British. Population, 167,000.

*Erfurt, air' foort*, a city which may properly be called the home of German flower seeds, is situated in Prussian Saxony. In the fifteenth century, its woolen and linen manufactures raised it to the position of the most important commercial town of Central Germany. It is now noted principally for the fact that there are more flower seeds grown in and around Erfurt than near any other city in the world; this advantage alone gives it an extensive trade. The manufactures are varied. Population, 135,000.

*Essen, es' en*, is situated in Rhenish Prussia, northeast of Düsseldorf, in the midst of a rich coal and iron district. The town grew from about 9,000 people in 1849 to over 450,000 in 1915, and to 468,000 in 1925. The greatest part of this increase was due to the development of the Krupp industries, which were the greatest headquarters for the manufacture of war munitions in the world during the World War. The Krupps now manufacture locomotives, railway equipment, motor cars, and other steel products.

The idea of an industrial community was conceived by Alfred Krupp in 1848. In its present numerous labor colonies, Essen represents a model industrial center where about 35,000 workers are housed under ideal conditions and enjoy many social advantages given to few workmen in ordinary industrial communities. See KRUPP, FRIEDRICH ALFRED.

*Halle, hahl'e*, an important city in Saxony, is situated on the River Saale, about twenty miles northwest of Leipzig. The town has an extensive trade and is particularly noted for its production of salt, which is found on islands in the river. There are numerous large establishments manufacturing machinery and other iron and copper goods. The University of Halle, which was founded by the Lutheran Church in 1694, is one of the leading schools in Germany. The town hall is a magnificent building dating from the fifteenth century, and near it stands a beautiful monument to Handel, the musician, who was born in this city. Population, 195,000.

*Hanover*. See HANOVER (province).

*Heidelberg, hi' del burk*, an ancient city of Baden, is located about fifty-five miles south of Frankfort, on a narrow strip between the River Neckar and the Rock of Heidelberg Castle. This famous building stands on a hill 300 feet above the town. Though now a ruin, its size and magnificence, its situation, and its interesting history place it among the most famous of the old castles in Europe. For description of the city's famous school, see HEIDELBERG UNIVERSITY. Population, 74,000.

*Jena, ya' nah*, a town of educational and historical fame, is situated ten miles southeast of Weimar, in the Federated State of Thuringia. It is the seat of the celebrated Jena University, which has acquired distinction in recent times through its departments of medicine, biology, philosophy, and theology, and which, through its school of practice, has exercised great influence on education in England and America. The city is a great center for the manufacture of optical instruments. Population, 52,650.

*Karlsruhe, or Carlsruhe, kahrls' roo a* (meaning *Charles's Rest*), capital of the state of Baden, is surrounded by parks and gardens and noted for its fine public squares, buildings, fountains, and monuments. It is situated five miles east of the Rhine River, and forty miles northwest of Stuttgart. Karlsruhe carries on a considerable trade through its manufacture of locomotives and machinery. Population, 136,000.

*Kiel, keel*, before 1918 the most important naval center of Germany and headquarters of the German fleet. It is the chief town of the Prussian province of Schleswig-Holstein, and is about fifty-three miles northeast of Hamburg, on the Bay of Kiel, an arm of the Baltic Sea. It consists of a somewhat cramped

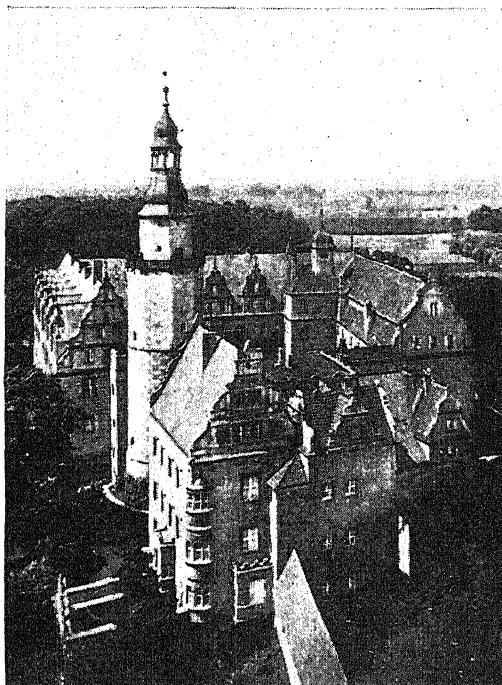


Photo: Wide World

#### HOME OF THE FORMER CROWN PRINCE

After his exile in Holland, following the World War, Frederick Wilhelm made his home here.

old town and a better built and more spacious newer part; the port and its approaches were very strongly fortified until after the World War. The city carries on an extensive trade with Denmark and Sweden, exporting coal, flour, beer, butter, cheese, and fish. The chief industry is shipbuilding, but there are also in operation numerous manufacturing establishments.

A great ship canal, of which Kiel is the eastern terminus, connects the Bay of Kiel with the North Sea, and is known as the Kaiser Wilhelm Canal (which see). In 1919 the Peace Conference ordered this canal open to all nations; that is, internationalized. Kiel is the seat of a university founded in 1665; here, too, is a castle built in the thirteenth century. Population, 215,000. Its strategic importance has decreased since the Versailles Treaty was signed.

*Königsberg, koe' niks bairk*, capital of the province of East Prussia, about 366 miles northeast of Berlin. Although founded in 1255, it is a modern town, since very few of its old buildings are now in existence. It is one of the chief continental shipping centers, and the center of the Prussian amber trade, and it also exports quantities of corn. It prepares over 175 tons of meerschaum annually. Its manufactures include pianos, thread, tobacco, cigars, and machinery. The commercial importance of the city has been enhanced by the construction of the Königs-

berg Ship Canal, extending to the city of Pillau, on the Bay of Danzig. Population, 280,000.

**Krefeld,** *kra' felt*, a manufacturing town of Rhenish Prussia, thirty-four miles northwest of Cologne. It is the center of the silk and velvet industry, and also has large engineering and machine shops. Krefeld is one of the few *open* towns of Germany; instead of the usual walls and a fortress about the town, four broad boulevards make a rectangle of the inner town. The silk industry was introduced in the eighteenth century, and since then the town has grown rapidly. Population, 131,000.

**Magdeburg,** *mahg' de boork*, one of the leading commercial cities of Prussia, and the capital of the Prussian province of Saxony, is eighty-eight miles southwest of Berlin. It is a modern fortress, as the term was understood prior to 1914. Built mainly on the left bank of the Elbe, it is divided from north to south by a wide avenue lined with historic shops and quaint old gabled houses. There are many beautiful churches, the most famous being the Cathedral of Saints Maurice and Catharine, built mainly between 1208 and 1363, but finished in 1521. Magdeburg's commercial importance is in its great machine shops. It is also the center of the German beet-sugar industry. Population, 294,000.

**Mainz,** *myntz*, a former German fortress of the first rank until 1919, when Germany was ordered to demolish all Rhine fortifications. It is the largest town in Hesse, and is situated on rising ground along the left bank of the River Rhine, twenty miles southwest of Frankfort. It is one of the most ancient of German cities, but its oldest part was modernized after 1857. The city is an important center of the Rhine trade with Holland and Belgium, and also carries on a large transit trade by railway. Its manufactures are numerous. Population, 110,000.

**Mannheim,** *mahn' him*, a city of Baden, situated on the right bank of the River Rhine, near its junction with the Neckar. The old fortifications have been converted into gardens, and the town is one of the cleanest in Germany. The flourishing machine works of the city turn out great numbers of agricultural implements and gasoline and electric motors.

The river trade of Mannheim has been stimulated by the construction of extensive docks and harbors. Population, 250,000.

**Nuremberg,** one of the quaintest and most interesting cities of Germany, is particularly famous as the world's manufacturing center for all kinds of children's toys made of wood. It presents a faithful picture of the well-to-do town of three centuries ago, with its moats and many-towered walls; its curious gateways; its castle, the original seat of the Hohenzollern family, perched high above the city; its narrow, crooked streets, lined with houses whose gables turn toward these streets; its bridges, spanning the Pegnitz River; its market place; and its many beautiful fountains. Nuremberg is regarded as the nursery of German poetry and the cradle of German art. It was the first city in Germany to found a gymnasium, a sort of secondary school for the people. In 1500 Peter Henlein invented watches, first known as "Nuremberg eggs." The first paper mill in Germany was established there, and printing was early introduced.

Though not now of such great relative importance as formerly, this enterprising city in Bavaria, ninety-five miles north of Munich, continues to occupy a high place among the industrial and commercial centers of Europe. It is still the center of the great toy industry of Germany. Over 200 factories produce, in addition, lead pencils, chemicals, and electrical supplies. Population, according to the census of 1925, 35,000.

**Oberammergau,** *o bur ah'm air gow*. See PASSION PLAY.

**Potsdam,** a city of the Prussian province of Brandenburg, is situated on the Havel River, sixteen miles southwest of Berlin, and is known as one of the residences of the late emperor of Germany. In the immediate neighborhood are several royal palaces, of which the most interesting is the former residence of Frederick the Great. Potsdam is a well-built city, having numerous fine squares and public gardens adorned with statues. Flower-gardening, especially the cultivation of winter violets, is a lucrative industry. Population, according to the 1925 census, 64,000.



A SCENE OF PEACE AND PLENTY

Terraced vineyards rising to a medieval castle of the robber barons of old Germany. Thus the past and the present stand out in vivid contrast in this scene along the storied Rhine.

tion, according to the census of 1925, 35,000.

**Oberammergau,** *o bur ah'm air gow*. See PASSION PLAY.

**Stettin, shtet een'**, the capital of the Prussian province of Pomerania, is situated on both sides of the Oder, eighty-three miles northeast of Berlin. It is one of the foremost ports of Germany and an important station on the route to the Baltic and Scandinavia. As a result of the rapid development of German shipbuilding, the city grew rapidly, and it now possesses some of the largest dockyards in the country. Stettin carries on a large trade in wood, corn, petroleum, wine, and fish, and is the seat of extensive industries, including the manufacture of clothing, sugar, chemicals, and machinery. Population, 255,000.

**Stuttgart, shtoot' gahrt**, a city noted for its beautiful situation and fine streets, squares, and buildings, is the capital of the Free State of Württemberg, and lies 115 miles northwest of Munich. It is at an elevation of nearly 900 feet above the sea, not far from the Neckar River, and is surrounded by verdant hills covered with vineyards and woods. About it are many attractive suburbs. Most of the buildings are stately examples of Renaissance architecture. Handsome churches, art museums, and educational institutions are numerous, and the city is beautified by statues, parks, and gardens.

Stuttgart is the chief center in South Germany of the printing and book-publishing industry, and its manufactures are numerous and varied. The city was the birthplace of Hegel. Population, 342,000.

**Wiesbaden, vees' bah den**, a noted watering place of Hesse-Nassau, Prussia, is situated in a sheltered valley on the southern slope of Mount Taunus, six miles north of Mainz. The surrounding hills are densely wooded and protect the city from the bleak winds of the north and east. There are numerous mineral springs in the city and vicinity, and thousands of visitors from all parts of the world are attracted to the place each year by these waters and by the pleasant climate. The springs were known to the Romans, and many relics of the Roman period have been discovered in the neighborhood. Wiesbaden is purely a residential town, without any industries of importance. Population, 103,000.

**Worms, vohrms** (in English, *wurmz*), one of the oldest cities of Germany, is beautifully situated in a productive Rhine district in the state of Hesse, twenty-two miles north of Heidelberg. Worms is of historical importance as the place of convocation of many German diets, notably that of 1521, when Martin Luther appeared before Charles V (see LUTHER, MARTIN). An imposing monument to the Reformer's memory was erected in the Luther Platz in 1868. The scene of the *Nibelungenlied* (which see) is laid at Worms. The vineyards on the hill that shuts in Worms to the south yield some of the most delicious wines of the Rhine. Population, 42,000.

**The Surface.** Germany has two sharply contrasted surface regions—a northern lowland and a central and southern highland, the latter occupying about two-thirds of the country. The lowland is a part of the great plain of Northern Asia and Europe, and stretches from the borders of Poland to those of Holland. For the most part, this plain is level, but there are several elevated tracts, which attain, in places, heights of 1,000 feet or more. Sloping to the north and northwest, to the shores of the North and the Baltic seas, this plain ends in

the low-lying coastal flats, with sand dunes and infrequent harbors. Only where a river, as the Elbe or the Weser, finds its way to the sea are their channels wide enough and deep enough for good ports.

The highland region is much less uniform; indeed, it may be divided into two well-marked sections. In the southeast is the Alpine country, with its spurs or ridges branching out from Switzerland. Here, in Bavaria, is found the highest altitude in Germany, the Zug Spitz, which has an elevation of 9,738 feet. North and west of this limited Alpine district are the highlands proper, a greatly diversified region, with high, fertile plains, rolling, hilly sections, and numerous scattered mountain ranges with rounded summits, few of which exceed 3,500 feet in height. Of these mountains, the most important are the Riesengebirge, or Giant Mountains; the Erzgebirge, or Ore Mountains, so called from the copper, iron, silver, and other ores which they contain; the Schwarzwald, or Black Forest, about which center so many traditions; and most famous of all, the Harz Mountains, with their culminating peak, the Brocken, which stands shrouded in mist, fairly inviting the weird and gloomy legends which cluster about it.

One of the very interesting points in the study of history is the relation which it bears to the geography of a country, and this is strikingly shown in the case of Germany. Had there been no branching mountains, acting as natural barriers and separating the territory into numerous high plains and valleys, inviting century upon century of warfare, separate states might never have been, for with freer intercourse, a single nation might have developed far earlier.

**Rivers and Lakes.** Germany is rich in rivers, having within its borders about 7,526 miles of navigable natural and canalized waterways and over 1,000 miles of canals. The central highland region acts as a "great divide," separating the rivers that flow into the North and Baltic seas from those that flow into the Black Sea. Of the latter there is but one of importance, the great Danube, which rises in the Black Forest and drains the greater part of Bavaria. The chief rivers which empty into the North Sea are the storied Rhine, the most important river of the country, though it has neither its source nor its mouth within Germany; the Ems; the Weser, with its great port of Bremen; and the Elbe, on which is situated Hamburg, the chief port of the country; while the most important flowing into the Baltic is the Oder. Certain tributaries of these larger rivers, as the Main, the Moselle, and the Saale, are also of considerable importance.

One of the lake regions of Germany is in the Alpine district in the southeast, where the glaciers of bygone ages carved deep basins in

the rocks. These mountain lakes have the clear, cold water and the same picturesque surroundings which have made the Swiss lakes the most famous in the world. Scattered about the northern plain are numerous shallow lakes—no fewer than 500 in all; but these, with their low, swampy shores, have no particular beauty or importance. The rivers which flow into the Baltic empty into land-locked bays, called *haffs*, very shallow and ringed with sand dunes.

**Climate and Life Forms.** Though Germany extends through almost nine degrees of latitude, there is comparatively little variation in temperature between the north and the south, because the high altitude makes the south cooler than it might otherwise be, while the sea breezes have just the opposite effect on the northern portion. Thus in the south the average annual temperature is about 52°, while in the north it is about 48°. The variation east and west is more marked, the inland region to the east having a distinctly continental climate, with extremes of heat and cold, while in the west the summers are not so hot nor the winters so cold. The rivers flowing into the Baltic are obstructed by ice for considerable periods each winter, but those flowing to the North Sea are seldom frozen over, except the Elbe, the easternmost of the North Sea rivers.

As to rainfall, there is almost everywhere enough for agriculture, but the distribution is very uneven. It is heaviest in the Harz Mountains, which average over forty inches each year and in some parts have sixty inches; but most of the mountain and western coast regions have from twenty-five to thirty inches.

In the very olden days, Germany was a heavily forested country, and many of the old myths and superstitions are connected with trees. The nation has not been as wasteful of its forests as some other countries, for to-day about one-fourth of the entire surface is wooded, and forestry is well advanced. That this is true, even the children may know, from the frequent allusions to foresters in their fairy tales. So thickly overgrown are some of the mountain ranges that they are called not *mountains* but *woods*, as Schwarzwald, or Teutoburg Forest. About two-thirds of the trees are cone-bearers—pines and firs; and the rest are chiefly oaks, beeches, and birches.

The animal life is in some ways very interesting, for in the Southern Alps and in the Harz Mountains are to be found foxes and wildcats, while wild boars and deer still roam many of the dense forests. Birds are numerous, but most of them are but transients, for two of the great migration routes cross Germany. See *BIRD (Migration of Birds)*.

#### Industries and Resources

Every phase of life has been changed immeasurably since the outbreak of the World

War in 1914. After the Treaty of Versailles, Germany passed through a period of inflation, in which paper marks were turned out as fast as the printing presses could produce them. It was a period of economic madness, in which the new republic seemed to feel that the appearance of prosperity would outweigh the actual facts of defeat. When a French army of occupation took possession of the Ruhr in 1923, the contact with hard reality, in connection with the inevitable effects of inflation, brought the Germans to their most desperate year since the close of the war. It is generally agreed that by the middle of 1923, Germany was near a political and economic catastrophe; it was even threatened with an uprising to institute a communist government on the pattern of the Russian experiment.

What prevented a real disaster was the appointment of a committee of experts to draft a plan for the payment of reparations based on what Germany could actually pay. Measures were taken to stabilize the currency, which kept the mark from losing value altogether. The Dawes Plan, so called, went into effect September 1, 1924. Under this plan the currency became stabilized, the government operated under a balanced budget, and industry and business became practically normal by 1927.

During the period of business depression, the fusion of principal producers into one or more groups was necessitated. The smaller firms were either absorbed or eliminated through bankruptcy. Such a condition was evident in coal, iron, steel, and many finishing industries.

**Mineral Wealth.** Germany is one of the richest in minerals of all the European countries, and its chief products are those two basic minerals, coal and iron. Before the war, only the United States and Great Britain, among the countries of the world, produced more coal, and only the United States more iron. Westphalia, Silesia, and Rhenish Prussia yield most of the coal, about ninety per cent of the annual output. The coal fields of second importance were lost as a result of the World War. Those in Upper Silesia were assigned partly to Poland, and those in the Saar basin were left in the hands of France until 1933, to offset Germany's use and destruction of French mines during its four years of occupation. In 1913 the total production of hard coal was over 190 million tons; ten years after the war, the production had decreased to 132 million. This was exclusive of lignite, for since the war an increase of thirty per cent in production has been accomplished, by means of systematically working the lignite beds.

The production of iron increased rapidly during the late nineteenth and the early twentieth centuries, the annual output of pig iron amounting before the war to almost 17,-

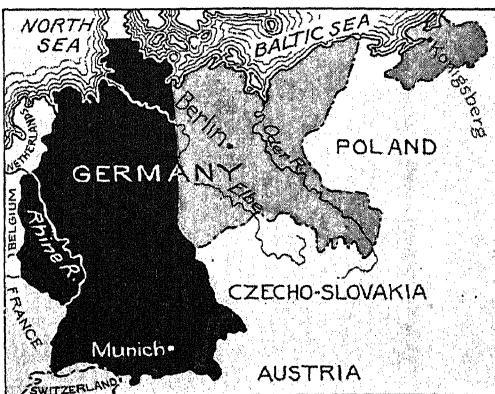
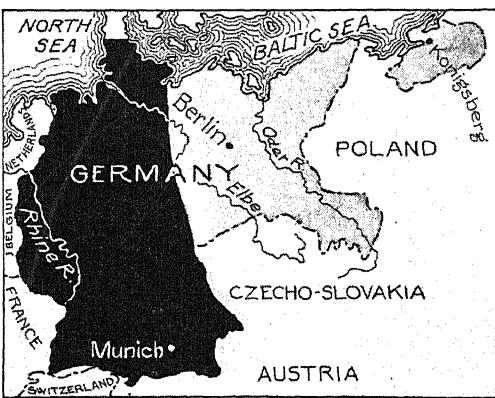
000,000 tons. Germany is more seriously crippled in regard to iron ore than any other mineral. Before the war, nearly three-fourths of the supply of iron came from the fields of Lorraine, about one-twentieth from Luxembourg, and the greater part of the remainder from Upper Silesia. In 1921 the Upper Silesia mines passed over to Poland, and about half of the blast furnaces, foundries, and rolling mills are now in Polish territory. Silver, copper, zinc, lead, and nickel are mined in considerable quantities. There are vast deposits of salt and of various potash compounds, and to these latter is due in large measure the growth in the chemical industries. All along the Baltic coast, amber of excellent quality has been obtained for fully two thousand years.

"Made in Germany." Without its mineral wealth, Germany could not have had its marvelous industrial development, or its successful industrial readjustment. In the value of its manufactures, some time before the war it passed France, long its rival, and was surpassed only by Great Britain and the United States. The "Made in Germany" legend, stamped on goods of various sorts, became very familiar in all parts of the world, and before the war its trade grew amazingly fast. The oldest and most important of the industries are the textile manufactures, whether cotton, linen, woolen, or silk. Much of the raw cotton and wool is imported, but in season, the high valleys of Silesia, Saxony, Westphalia, the Harz, and other districts are blue with the spreading fields of flax. During the war and directly following, the textile industry experienced a tremendous decline. The number of spindles in the cotton mills alone fell almost two million between 1913 and 1924. Considerable progress has been made since then; however, pre-war production has not been reached.

The metal industries in all their branches of steel and iron rolling, the making of machinery, and the manufacture of hardware and instruments have experienced the largest growth. The products of the great Krupp gun works, which employed over 30,000 workers, became known the world over; these works now produce locomotives, motor cars, and steel products. In many kinds of smaller metal goods, as cutlery, tools, and instruments, the Germans have long enjoyed an equal proficiency. Their scientific instruments, in particular, are considered the most accurate in the world. Beet sugar, of which more is produced than in any other country; beer, of which an average of over twenty-two gallons to each person is consumed annually; chemicals; great ships; toys, clocks, and carved woodenware—in the making of all these, German workmen are most proficient.

**Agriculture.** Time was when Germany raised practically all the foodstuffs it needed,

but now much food has to be imported, partly because of the loss of cultivated lands, as a result of the war, and partly because many have



GREATNESS OF THE RUHR VALLEY

The first map shows (in black) the size of the Ruhr with respect to the remainder of Germany. It appears comparatively small and insignificant. However, in coal production, it represents 69 per cent of German coal and 66 per cent of its steel. In terms of coal and steel, the Ruhr is over half of Germany, as shown in the second and third maps.

left the farms for industrial life. In the urgent need for decreasing the import of agricultural products, and for raising Germany's total of

agricultural yield, a movement was begun for reclaiming waste lands, estimated to amount to 7,500,000 acres. In spite of this measure, the areas under cultivation are still considerably less than formerly. Production per acre also decreased, owing in part to the almost prohibitive prices of fertilizers following the war. In 1925 there were over 5,000,000 farms with a total area of over 67,000,000 acres, the average being about thirteen acres each. Three million farms are less than five acres in extent. But the German farmer is painstaking and intelligent, and by the use of modern methods and machinery, he wrests from the soil, in some places none too fertile, a fair living.

Crops are widely varied, but in the country as a whole, cereals, potatoes, and hay predominate. Of the cereals, rye is the most important, and rye bread is as distinctly the staple food of the poorer people of Germany as is wheat bread in Canada and the United States. Over a million acres are under sugar beets, which form the prevailing crop of North Germany, while in the south and west, especially in the valleys of the Rhine, Main, Moselle, and Neckar, the vine is the most characteristic growth, Rhine wines being famous throughout the world. Flax in the central region, hops, corn, and fruits in the south, and almost everywhere wheat, barley, rye, and oats—these are the outstanding crops. The government has done much to encourage agriculture, and a spirit of intelligent coöperation among the farmers themselves has worked for progress.

Stock-raising is of considerable importance, for Germany has much partially drained marshland with a rich growth of grass. Of the domestic animals, swine are the most numerous and cattle the next, the number of sheep having declined three-fourths within the last three decades.

**Transportation.** With its naturally navigable rivers, canalized rivers, and canals, Germany is well supplied with waterways, whose total extent is 8,500 miles. Some of the canals are famous, notably the Kaiser Wilhelm Canal across the peninsula of Jutland, which connects the Baltic with the North Sea. The country is not dependent for transportation upon waterways alone, for it has one of the largest and most complete railway systems in the world. Only Russia, the United States, Canada, and India, far vaster in extent, exceed Germany's total of 35,000 miles, and only Great Britain surpasses it in length of railway compared with its area. Berlin is the chief railway center. Since the adoption of the Dawes Plan, however, the German Railway Company, a private firm, has managed the German railway system; 32,658 miles of the total mileage are the property of the Reich.

**Commerce.** No other country except Great Britain had so large a foreign trade as had

Germany up to August, 1914. The remarkable industrial development brought about a corresponding commercial growth, and in the years before the war, the value of the total foreign commerce was about \$4,600,000,000. Of this amount, the imports made up somewhat more than half, and in this respect Germany differed from the United States, which exports more than it receives. Fully one-half of the imports were raw materials for its factories, and one-third consisted of food-stuffs, while the exports were largely manufactured goods—textiles, metal products, chemicals, certain made foods, toys, and small wares.

Because of the great decline in the value of the mark, it is difficult to give the actual figures representing foreign trade for more than a decade following the year 1913. In that year the imports were nearly 11,000,000,000 marks (about \$2,750,000,000); two years after the close of the war, they reached about 4,000,000,000 marks, and not until 1926 did they reach pre-war figures. The exports in the year before the war were 10,000,000,000 marks; in 1920 efforts of over a year had restored this trade to nearly 4,000,000,000 marks, but not until 1927 was the total of exports restored to the pre-war basis.

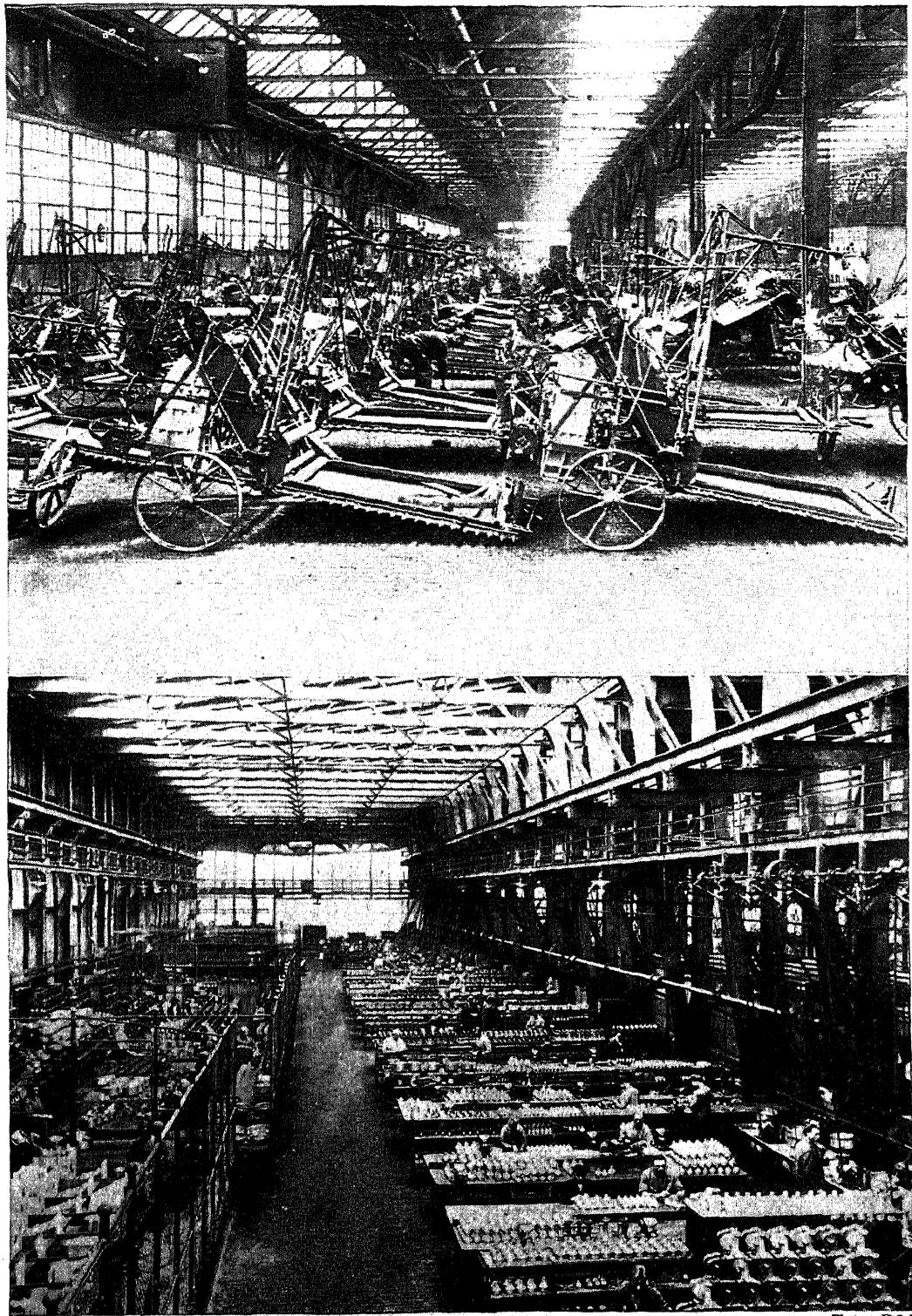
Germany's colonial policy dated from 1884, and was inaugurated by Bismarck. At the opening of the World War, the total area of German colonies was 1,140,115 square miles, distributed as follows:

| COLONIES                     | AREA            |
|------------------------------|-----------------|
| Togoland.....                | 33,668          |
| Kamerun.....                 | 305,019         |
| German Southwest Africa..... | 322,432         |
| German East Africa.....      | 384,170         |
| New Guinea.....              | 92,064          |
| Caroline Islands.....        | 956             |
| Samoa.....                   | 993             |
| Kiao-Chau.....               | 213             |
| Total.....                   | <hr/> 1,140,115 |

Not a square mile of foreign territory remained to Germany at the end of the war.

#### Social Conditions

**Education.** The very first rank in educational matters is generally conceded to Germany, whether reference be had to the development of the arts and sciences, or to the general spread of ordinary education. Different indeed would be the history of education if the names of German educators were omitted. There are practically no illiterates in Germany, only two out of ten thousand of the military and naval recruits before the World War being unable to read and write. The compulsory education law, which provides that every



Photos: U & U

The Krupp Works in Peacetime. This greatest of Germany's industrial enterprises was established for the purpose of making munitions of war. Its vast buildings now contain machinery only for the manufacture of articles of merchandise.

child between the ages of six and fourteen must attend school throughout the whole school year, is rigidly enforced.

This entire compulsory period may be spent in the "folk schools," as they are called, and these are free. Children who intend to go beyond these primary schools, however, do not take the whole eight-year course in them, but are transferred, after they have learned the rudiments, to higher schools; while those who continue in the folk schools rarely go to any other, unless it be the "continuation schools," which fit them for trades.

Many of the secondary schools have special preparatory schools in connection with them, and in these, as in the secondary schools themselves, fees are charged. The most famous type of these secondary schools is the *gymnasium*, a school which places chief emphasis on the classics. There are also the more modern *realschule*, which stresses mathematics, science, and the modern languages, but includes Latin; and the *oberrealschule*, which rules out the classics altogether; and in recent years there has grown up a combination type which has the advantage of making it unnecessary, as heretofore, to settle upon a boy's career when he is but nine years old. These schools are for boys only, since until recent years the state has paid little attention to the higher education of girls, leaving that to private institutions. To-day, however, there are three kinds of girls' schools, which correspond to the three types described above.

Of universities, Germany has no fewer than twenty-three, some of them among the most famous in the world—great schools to which students flock from all over the world to obtain those degrees which have bestowed more prestige than degrees gained elsewhere. The largest universities are those of Berlin, Munich, and Leipzig, but those of Bonn, Göttingen, Freiburg, Halle, Heidelberg, Würzburg, and Jena are but little less celebrated.

Germany has been a pioneer in the establishment of vocational schools, especially of those which are but part-time schools, open to young people who must spend the greater part of their time at work. There are also commercial schools and famous technical schools where a man may learn to be an engineer, a forester, a worker in metals, a ship-builder, an architect—almost anything, in fact, toward which he feels a particular inclination.

**Religion.** There is no state religion, and freedom of worship prevails. In this country, which was the birthplace of the Reformation, the Protestant or Evangelical faith predominates, claiming about sixty-one per cent of the population, while the Catholics have thirty-six. There is a rather sharp territorial division, some states being largely Evangelical, some almost entirely Catholic; the distribution, in-

terestingly enough, is very similar to what it was in the earliest days of Protestantism, over four centuries ago. There are within the country over 600,000 Jews.

### Government

Before the old order in Germany passed away, in the autumn of 1918, the German Empire consisted of twenty-six states, as follows:

Kingdoms: Prussia, Bavaria, Saxony, and Württemberg.

Grand Duchies: Baden, Hesse, Mecklenburg-Schwerin, Mecklenburg-Strelitz, Oldenburg, and Saxe-Weimar.

Duchies: Anhalt, Brunswick, Saxe-Altenburg, Saxe-Coburg-Gotha, and Saxe-Meiningen.

Principalities: Waldeck, Lippe, Schwarzburg-Rudolstadt, Schwarzburg-Sondershausen, Reuss-Schleiz, Reuss-Greiz, and Schaumburg-Lippe.

Free cities: Hamburg, Lübeck, and Bremen.

Imperial province: Alsace-Lorraine.

With the end of the war and the crumbling of the empire, more than 300 royal personages, of high and low degree, lost their exalted stations; some fled to safety in other countries. In the old confederation of states, Prussia was the strongest member, and under the constitution of the empire, the king of Prussia was the hereditary German emperor, with vast powers in the civil organization, and with sole power of declaring war and peace. He appointed the Chancellor, who became responsible for all the acts of his imperial master.

There were two legislative bodies. The *Bundesrat* represented the different states, and in some degree was comparable to the American Senate. The *Reichstag*, or Parliament, was the lower body, and to a slight extent could be compared to the American House of Representatives.

**Republican Germany.** For months after the close of the war, governmental affairs were in an extremely unsettled condition, but strong efforts resulted in the organization of the German Republic (Deutsches Reich). The republic consists now of all-German states, or territories, each of which determines its own constitution, and some of which have their own Presidents.

The first National Assembly was summoned in February, 1919, when it elected the first President of the German Republic, in the person of Friedrich Ebert. The President must be at least thirty-five years old and a German citizen for at least ten years. His term of office is for seven years, but the recall may be employed to dismiss him through popular vote.

On July 31, 1919, the Constitution of the republic was adopted by the National Assembly. It declares that the new Commonwealth is a republic, and that the power of the state is derived from the people. It abolishes all privileges of class, declares all Germans



Photo: U & U

Home of the German President. The Presidential palace formerly belonged to the royal family of Prussia.  
It is in the Wilhelmstrasse, Berlin.

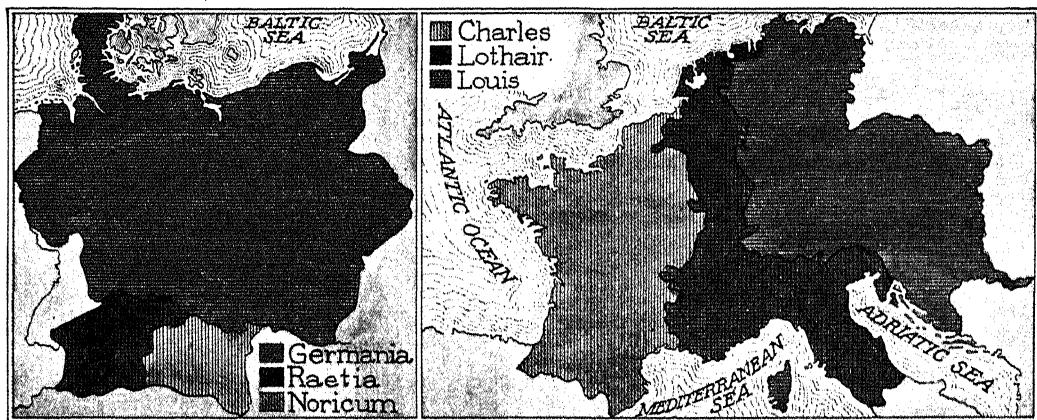
equal before the law, guarantees freedom of speech and of the press, and the right of petition. The Constitution further provides for central and state legislative organs—a state council (Reichsrat), the representation of the component states; a legislature of the republic (Reichstag); and a Cabinet which is appointed by the President. At the head of the Cabinet of fourteen members is the Chancellor, corresponding to the English Premier. Mem-

bers of the legislature of the republic are elected by universal, equal, and secret vote of males and females. The Reichsrat, which consists of sixty-eight members, has no direct part in legislation, but all bills must receive the assent of the Reichsrat before being introduced. The Reichstag consists of one deputy for every 60,000 people, elected for four years, and has the power of enacting a bill into law over the Reichsrat by a two-thirds majority.

### History of Germany

**Its Beginnings.** Almost more than that of any other nation, the history of Germany has been one of wars. At almost any point where the student takes it up, the clash of arms may be heard, for the German nation, as a nation, has been long in the making and every step has been gained by conquest. It is as a fearless, warlike people that the Romans first

disastrous, however, because in A.D. 9 the Germans under Arminius won a complete victory over the Roman legions in a battle which ranks among the decisive ones of the world, for it made it certain that Germany should be Teutonic and not Latin (see *FIFTEEN DECISIVE BATTLES*). Later expeditions were dispatched to the country, but the Romans never again



BEGINNINGS OF GERMANY

At left: Germany at the beginning of the Christian Era, showing the provinces of Raetia and Noricum, added to the Roman Empire during the reign of Augustus, and the frontiers along the Rhine and Danube, by which the empire was bounded after A.D. 9. At right: Empire of Charlemagne, as divided in 843. The Holy Roman Empire under Charlemagne was apportioned after his son's death among his three grandsons, Louis the German, Lothair, and Charles the Bald, by the Treaty of Verdun.

knew these dwellers on their northern borders, and the first definite fact in their history was their defeat of the Roman consul Papirius in 113 B.C. Eleven years later, the great general Marius administered in turn a defeat to these Teutones, as they were called, for the term *Germans* was a later name, probably formed by the Romans from some Gallic word.

It was Julius Caesar who, during his campaigns in Gaul, gave to the Roman world the first definite information about some of the barbaric tribes beyond the Rhine—those tall, fair-haired strangers who feared not even the Roman legions. Nominally, Caesar brought Germany under Roman sway, and in the days of Augustus, an attempt was made to convert this nominal subjugation into a real one, by introducing Roman customs. The effect was

gained a foothold, while they, on the other hand, were forced constantly to defend themselves against the invasions of various German tribes—the Alemanni, the Franks, the Goths, Vandals, and Lombards.

**A Troubled Time.** For centuries nothing is known of the internal history of these warring, shifting tribes, which were in no sense a nation. When France, under Clovis, became a state, more and more of the German tribes became assimilated therewith, and in this period the history of Germany is identical with that of France [see *FRANCE (History)*]. Charlemagne's great empire included Germany as far to the north and east as the Elbe, and was in fact more German than French. In 843, with the Treaty of Verdun, which assigned to Charlemagne's grandson Louis the eastern part

of the empire, the separate existence of Germany really began. From that date, France and Germany, in their earlier stages united, have grown farther and farther apart, and rarely has there been a time when perfect friendliness has existed between them.

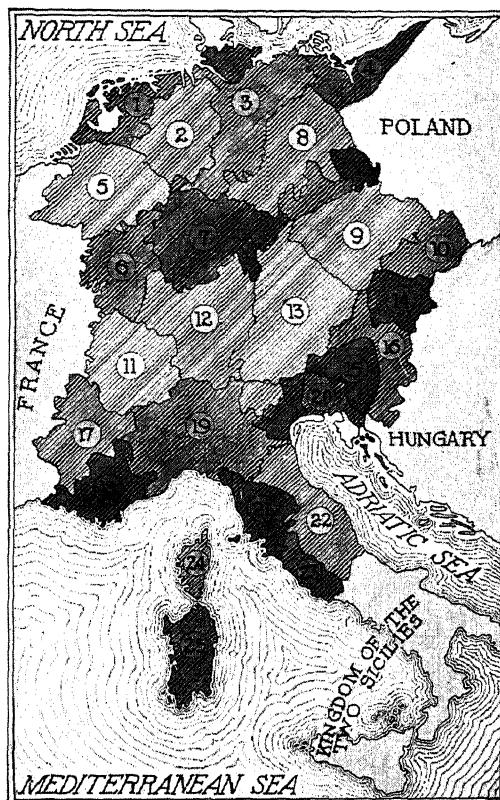
The newly established German state had to fight for its very existence, first with the Moravians, who set up a kingdom in the territory which still bears their name, then with the invading Magyars, or Hungarians. These Magyars, who had swept westward from Northern Asia, Arnulf, the German king, had invited to aid him in his struggle with the Moravians, only to find in them a far more dangerous enemy. The reigns of Louis the Child (899-911) and of Conrad were largely taken up with vain attempts to stay the pillaging, slaughtering Magyar hordes.

**Kings and Nobles.** Though it had one king, Germany was not at that time a single state, but a number of duchies, whose rulers possessed high privileges. They elected the king, and his power depended very largely upon whether or not he retained their good will. When Conrad died, in 918, the strongest of these nobles, Henry the Fowler of Saxony, was chosen king, and under him much was accomplished. He defeated the Magyars and the Slavs, reduced the power of the great nobles—indeed, did a work which entitles him to rank as the real creator of the later German Empire. Every lover of music is familiar with him as the kingly judge of Wagner's *Lohengrin*.

Otto I therefore succeeded in 936 to a fairly united state, which he proved strong enough to hold together. He defeated the Hungarians so decisively that they never again attempted to invade the west, still further restricted the power of the nobles, and conquered Lombardy, placing on his head the famous Iron Crown of the Lombards [see CROWN (Iron Crown)], and receiving at the hands of the Pope the imperial title of Holy Roman Emperor. So came into existence that curious anomaly, the Holy Roman Empire, which endured until 1806. Many of the kings who followed Otto, possessing his ambition without his ability, strained all their powers to make conquests in Italy, and for the sake of this foreign field neglected Germany itself. The nobles were prompt to take advantage of this state of affairs, drawing more and more power into their hands. However, in 1024 a strong king, Conrad II, came to the throne, and for a time asserted the royal rights. He also conquered Burgundy for Germany and reduced the Polish kingdom, which had grown to a dangerous strength on the eastern frontier, to the rank of a vassal dukedom.

**Conflict with the Papacy.** Henry III, Conrad's son, who came to the throne in 1039, was a worthy successor of his father, and the great

nobles ceased their aggressions for the time. But another conflict was beginning—a conflict which colors much of the history of medieval Germany; for the Pope, whose privilege it was to crown the Holy Roman emperors, felt



UNDER FREDERICK I, BARBAROSSA

- |               |                             |
|---------------|-----------------------------|
| 1—Holland     | 14—Austria                  |
| 2—Westphalia  | 15—Carinthia                |
| 3—Saxony      | 16—Styria                   |
| 4—Pomerania   | 17—Arles                    |
| 5—Brabant     | 18—Provence                 |
| 6—Lorraine    | 19—Lombardy                 |
| 7—Franconia   | 20—Aquilia                  |
| 8—Brandenburg | 21—Tuscany                  |
| 9—Bohemia     | 22—Ancona                   |
| 10—Moravia    | 23—Patrimony of Saint Peter |
| 11—Burgundy   | 24—Corsica                  |
| 12—Swabia     | 25—Sardinia                 |
| 13—Bavaria    |                             |

that thereby he gained the right to interfere in imperial affairs, while the emperors, as they became stronger, resented such interference. It so happened that a strong Pope, Gregory VII, and a weak emperor, Henry IV (1056-1106), were ruling at the same time, and Gregory was able to deprive Henry of some of his prerogatives and to force him to do penance in the guise of a beggar [see HENRY (IV, Germany)]. Under Henry V (1106-1125) and Lothair (1125-1137) the imperial power diminished, so it became in reality but a shadow.

*The Famous Hohenstaufens.* In 1138 there came to the imperial throne a new dynasty, the Hohenstaufens, the early part of whose ruling period was the most glorious in the history of medieval Germany. These emperors had a definite purpose—they were determined to make good Germany's hold on Italy, and to wrest from the Pope his temporal powers. Religion was a dominating force through all this time, for this was the period of the Crusades (which see). Frederick I, the beloved Frederick Barbarossa (1152-1190), about whose name legends still hover, was the greatest of the Hohenstaufen emperors, and had he not met his death while on the Third Crusade he might have strengthened permanently the imperial power. As it was, his successors were for the most part men of little ability, and in the end their powers were so encroached upon by the Papacy, and by the great nobles, that when the dynasty came to an end, in 1254, the titles of German king and Holy Roman emperor were but empty honors.

During this period, significant changes had taken place in Germany. Manners and customs had become more refined; women had begun to be looked upon with more respect; the songs and tales of the Minnesingers (which see) had acquired wide popularity; magnificent cathedrals had risen under the influence of the religious enthusiasm generated by the Crusades, and the cities had acquired a degree of freedom and of prominence unknown before.

*Another Rise and Fall.* For about twenty years after the death of the last Hohenstaufen, anarchy prevailed in Germany. The electors offered the crown to the highest bidder, but of all the rival rulers, none acquired any real power. Finally, in 1273, the electors chose a man whom they thought weak enough not to interfere with their sovereign rights—Rudolph of Hapsburg; and thus that celebrated family came to the throne of Germany. Rudolph proved more vigorous than the electors had hoped, restoring at least a semblance of order and strengthening the royal authority. He showed that favor to his own family for which the Hapsburgs were later noted, and by granting to his son as a dukedom certain territories that he had acquired in war, of which the chief was Austria, he laid the foundation of the state of Austria, with its long line of Hapsburg rulers.

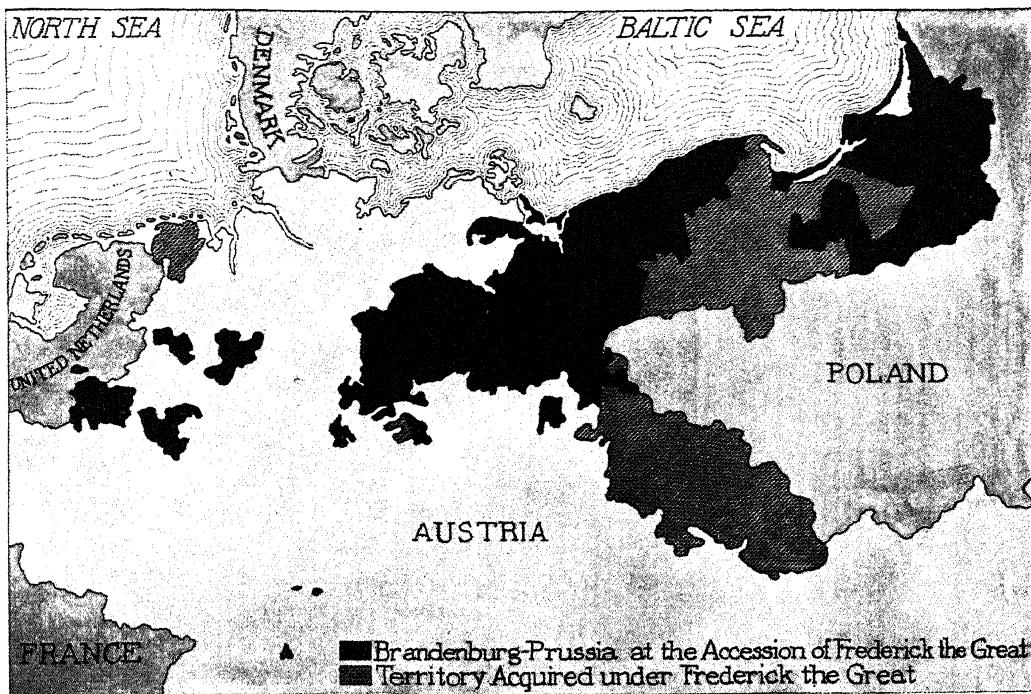
For over a hundred years, there followed another of those troubled periods, when the royal power was held first by one family, then by another. Significant events which stand out are the successful revolt of the Swiss against Austria; the proclamation by Charles IV (1348-1378) of the Golden Bull (which see), which defined the powers of the electors; and the war with the Hussites, brought on by the failure of Sigismund (1410-1437) to protect

John Huss as he had promised. In 1438 Albert II of Austria, the descendant of that early Albert to whom was granted the domain of Austria, was made emperor, and for almost four centuries, the Hapsburgs bore the imperial title, though each time the electors went through the form of choosing. A strong man came to the throne late in the fifteenth century—Maximilian I (1493-1519); and under him the empire became again an entity.

Even more powerful was his grandson, Charles V (1519-1556), who during much of his long reign was the dominant prince of Europe, for not only Germany, but Spain, Naples, and the Netherlands were under his sway. But even during his reign, when the imperial power was at its very height, the breaking up of the empire was beginning. Luther had nailed to the church door his ninety-five theses, and therewith the Reformation had begun. (For the history of this period see LUTHER, MARTIN; REFORMATION; CHARLES V.) The conflict between Catholics and Protestants was brought to an end temporarily in 1555, by the Peace of Augsburg, which allowed to the Lutherans a certain measure of religious freedom; but this agreement opened up new dissensions.

*The Thirty Years' War.* The reigns of Charles's successors, Ferdinand (1556-1564), Maximilian II (1564-1576), and Rudolph II (1576-1612), saw the growth of that important movement known as the Counter-Reformation, and an ever-widening gulf between the Catholics and Protestants. In 1617, during the reign of Emperor Matthias (1612-1619), the ardent Catholic Ferdinand was crowned king of Protestant Bohemia, and the result was that gigantic struggle known as the Thirty Years' War. Conditions in Germany during the war were almost indescribable, and at its close in 1648, the country was completely exhausted. Most of the population of the country districts had been killed, enormous debts had been incurred, and many of the industries had been ruined. Moreover, most of the princes had gained, as the price of their aid in the war, practical independence, and instead of one Germany, there were about two hundred small states, each of which was only nominally subject to the emperor. The imperial authority was completely wrecked, and national feeling was dead, except in so far as most of the states had come to look upon themselves as in some way opposed to Austria. Thus was worked out the policy of Richelieu, Prime Minister of France, who determined to weaken Germany, that France might be strong.

*Germany to the Time of Napoleon.* Meanwhile, one of the states of Germany was gradually acquiring an increased power. This was Prussia, and it is in the rise of this power that the interest in German history centers for a



## GROWTH OF PRUSSIA UNDER FREDERICK THE GREAT

The territory acquired by Frederick the Great corresponds roughly to that returned to Poland in 1919.

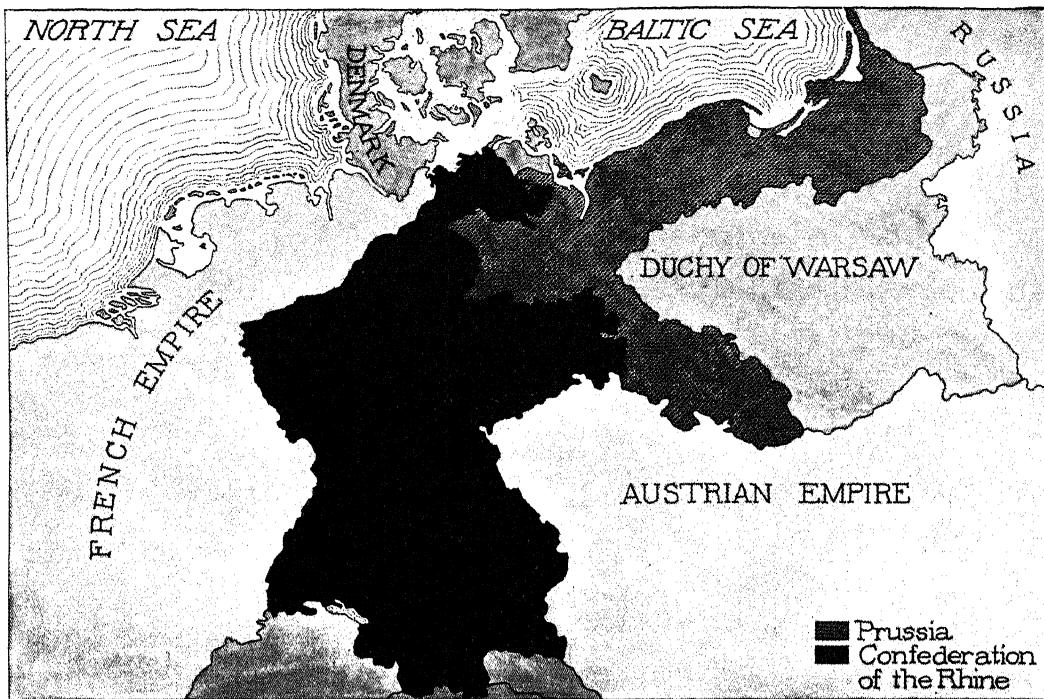
century and a half after the close of the Thirty Years' War [see PRUSSIA (History)]. In theory, the ruler of Prussia, who in 1701 took the title of king, still owed allegiance to the emperor, but in reality there was growing up a determined antagonism between them. A crisis occurred in imperial affairs in 1740, when with the death of Emperor Charles VI (1711-1740) the male Hapsburg line died out, and in accordance with the Pragmatic Sanction, his daughter Maria Theresa attempted to assume the imperial title. Soon after the close of the War of the Austrian Succession, another war broke out, between Maria Theresa and the ambitious king of Prussia, Frederick the Great (which see). By his conduct of the Seven Years' War, Frederick brought Prussia still farther to the fore as the natural enemy of Austria and as the one possible center for a future united Germany.

The great European upheaval which followed upon the French Revolution affected Germany profoundly (see BONAPARTE, NAPOLEON), ending even the nominal existence of the empire, for in 1806 Francis II formally resigned the title of Holy Roman Emperor and took that of Emperor of Austria. It was Napoleon's idea to isolate Austria and Prussia and to form of the west German states a Confederation of the Rhine, but after his fall, the Congress of Vienna formed all the German

states into a confederacy, with Austria at its head.

Rivalry of Austria and Prussia. The plans for the confederation included the promise of constitutions for the different states, but this provision was in the main ignored, and there were constant disturbances, owing to the demands of the people for constitutional government. It was in 1830 and 1848, those years when the revolutionary spirit was felt throughout all Europe, that these disturbances culminated, many of them successfully. In 1830 was formed the customs union, or Zollverein, among the states, and this fostered the growing feeling of nationality which in 1848 resulted in the assembling of a national parliament at Frankfort. But Austria and Prussia, by their rivalry, brought to naught the federation plans, and the Prussian king, Frederick William IV, refused to accept the title of emperor of the Germans.

In the year 1861 a new king, William I, came to the throne of Prussia, and he was a man of bolder spirit. He called to his aid Bismarck, chief among the nation-builders of modern Europe, and under the direction of that determined minister, the unification of Germany proceeded apace. Bismarck's deliberate plans for breaking with Austria are described in the article under his name and in that on the Seven Weeks' War. Emerging from this strug-



#### GERMANY AT THE HEIGHT OF NAPOLEON'S POWER

The French extended their empire eastward to the Baltic Sea, and included Magdeburg. At this time Westphalia was a kingdom ruled by Napoleon's brother, Jerome.

gle with new prestige, Prussia gathered about it the neighboring states in a North German Confederation, of which the king of Prussia was president; but even then the ambition of Bismarck was not satisfied.

**The Birth of a Nation.** He saw ahead a war with France, and prepared for it carefully, so when the latter nation, jealous of the growing power of the Hohenzollerns, forced the issue, the victory of Germany was sure (see FRANCO-GERMAN WAR). France paid a large indemnity and gave back to Germany Alsace and Lorraine, those much-prized territories which had belonged to Germany through a thousand years, but which Louis XIV had conquered for France. More important to Germany than any territorial gain was the awakening of an intense national feeling among the states, which made it possible to change the confederation into an empire and to proclaim William I as German emperor. This was done on January 18, 1871, and the state was launched on its imperial career. Bismarck kept the helm during the lifetime of William I and during the short reign of his son, Frederick III, who succeeded in 1888 and died in the same year; and the colonial power of Germany, the formation in 1883 of the Triple Alliance, including Germany, Austria, and Italy, and the anti-Socialist agitation were all his work.

**The Reign of William II.** But the Iron Chancellor, as Bismarck was called, did not find favor with the young and aggressive William II, who came to the throne in 1888 and showed at once his determination to be the real ruler of Germany, so far as the Constitution would permit. Bismarck therefore resigned in 1890, and the list of his successors includes Caprivi, Hohenlohe, von Bülow, and von Bethmann-Hollweg, the latter becoming Chancellor in 1909. Germany took an active part in Eastern affairs in 1898 when, after the murder of two German missionaries in China, the port of Kiao-Chau in Shantung was leased and made the center of a German protectorate in that region (see KIAO-CHAU). Two years later, German troops were prominent in the suppression of the Boxer Rebellion (which see).

**Germany and the World War.** In the summer of 1914 there began in Europe the greatest struggle of all times, known as the World War. Germany claimed not to be the primary aggressor in the war, but for many years it was widely charged with chief responsibility. At first, interest centered chiefly in Germany and England, between which the struggle was intense. Germany asserted that Great Britain was its most malignant enemy, due to the fact that the latter's navy was effecting a blockade of the German Empire. So

## OUTLINE AND QUESTIONS ON GERMANY

### Outline

#### I. Location and Size

- (1) Centrally located in Europe
- (2) Latitude,  $47^{\circ} 16'$  to  $55^{\circ} 53'$  north
- (3) Longitude,  $5^{\circ} 52'$  to  $22^{\circ} 52'$  east
- (4) Geographic relation to other countries
- (5) Effect of location
- (6) Size

#### II. What Constitutes Germany

- (1) Free States
- (2) Federated State
- (3) Republic
- (4) People's States
- (5) Provinces

#### III. Physical Features

- (1) Sea Coast
- (2) Highland and lowland
  - (a) Northern lowland
    - 1. Part of great plain
    - 2. Fairly monotonous surface
  - (b) Southern highland region
    - 1. Alpine country
    - 2. The highland proper
- (3) Effect of surface features on history
- (4) Rivers
  - (a) 8,500 miles of navigable waterways
  - (b) Chief rivers
- (5) Lake regions

#### IV. Climate

- (1) Comparatively even climate
  - (a) Effect of mountains and sea
- (2) Greater variation east and west than north and south
- (3) Rainfall

#### V. The People

- (1) National characteristics
- (2) Diversified character of people
- (3) Languages
- (4) Population
- (5) Density compared with that of other countries
- (6) Cities

#### VI. Industries

- (1) Mining
  - (a) Great mineral wealth
  - (b) Chief products
    - 1. Coal
    - 2. Iron
- (2) Manufacturing
  - (a) Marvelous development

#### (b) Chief products

- 1. Textiles
- 2. Metal goods
- 3. Beet Sugar
- 4. Beer

#### (c) Industrial insurance

#### (d) Agriculture

- (a) Necessity for importation of food-stuffs
- (b) Methods employed
- (c) Chief crops
  - 1. Cereals
  - 2. Potatoes
  - 3. Hay
- (d) Stock-raising

#### VII. Transportation and Commerce

- (1) Railroads
- (2) Rivers
- (3) Canals
- (4) Large foreign commerce

#### VIII. Education and Religion

- (1) High rank educationally
  - (a) Practically no illiterates
  - (b) The school system
- (2) No state church
  - (a) Distribution of Protestants and Catholics

#### IX. Government

- (1) President
- (2) Powers of the Reichsrat; Reichstag
- (3) Position of Chancellor
- (4) System of voting
- (5) Power of the people

#### X. History

- (1) In earliest times
- (2) The era of Charlemagne
- (3) The feudal period
- (4) The Holy Roman Empire
- (5) Struggle between Emperor and Pope
- (6) The Hohenstaufen dynasty
- (7) The Reformation
- (8) The Thirty Years' War
- (9) The rise of Prussia
- (10) The Napoleonic Era
- (11) Rivalry of Austria and Prussia
- (12) Franco-German War and establishment of the empire
- (13) Recent development
- (14) The World War

## OUTLINE AND QUESTIONS ON GERMANY—Continued

### Questions

- Who was the first President of the republic of Germany?
- In what way was President von Hindenburg, in his official capacity, a disappointment to the enemies of the republic?
- How much did the mark, the basis of German coinage, depreciate after the World War?
- Has Germany developed a system of air transportation?
- What territory did Germany lose when defeated in the World War?
- Why are not all the inhabitants of Germany Germans, in the same sense in which the people of the United States are Americans?
- In what way do the "folk schools" differ from primary schools in the United States?
- What great emperor had to humble himself and don the guise of a beggar, and why?
- In what sense was Frederick the Great the forerunner of Bismarck?
- What characteristic have the Germans which takes the place of English determination and French quickness?
- What typically German river has neither its source nor its mouth within Germany?
- At the outbreak of the World War, how many countries surpassed Germany in value of manufactures?
- How does Germany rank as regards percentage of illiteracy?
- Who was the last of the royal line of the Hohenzollerns?
- What was the Iron Crown of the Lombards, and when did it play a part in the history of Germany?
- What were the chief effects of the Thirty Years' War?
- What does the expression "a place in the sun" signify, and how has it been used in connection with Germany?
- How might the history of this country have been different if there had been no mountain systems?
- What product still obtained along the Baltic coast was famous in the days of the Roman Empire?
- What medieval king of Germany was made famous by one of the greatest music dramas of modern times?
- When did the nailing of certain "theses" on a door change the history of a continent?
- How far can you travel in a straight line in Germany?
- How does the highest point in Germany compare in altitude with the highest in France? In England? In Alberta?
- How does Germany rank as a coal producer? As an iron producer?
- How many countries have a greater railroad mileage? How many have a greater mileage in proportion to population?
- How did the Franco-German War help in the founding of the empire?
- What part of North America is approximately in the same latitude as Germany?
- Why are the transient birds of the country very numerous?
- Who deliberately plunged the nation into war in order to humble a rival?
- What mountains in Germany are not called mountains?
- What early battle on German soil ranks among the world's decisive conflicts?
- How many countries of Europe have a greater average density of population?
- What is the difference in the ordinary meaning of the word *gymnasium* in Germany and in America?

serious did the blockade become that Germany, through a submarine campaign against friend and foe alike, sought to stop all commerce with its enemies and reduce them, also, to the starvation point. Vessels of all nations were torpedoed on sight and without warning, and this direct violation of international law so alarmed the great neutral nations that on April 6, 1917, the United States declared that through Germany's acts a state of war existed between those two countries. Soon the Central Empires, Germany and Austria-Hungary, were facing a world of foes. The story of the war and its causes appears in detail in the article WORLD WAR.

During the years 1921, 1922, and 1923, Germany faced almost insurmountable economic difficulties, to which reference has already been made. Repeatedly, Germany declared itself unable to pay great sums in reparations. The key to the whole situation, it was universally believed, was an agreement between Germany and the allied nations, particularly France, on the subject of reparations. The peace treaty had fastened upon Germany an obligation to pay in penalties a sum equal to \$33,000,000,000. The Dawes Commission in 1924 gave a real basis for economic adjustment and reparations, so that after six years of strife, rebellion, political dissension, hunger, and economic distress, Germany's impending financial collapse was averted.

In 1925 General von Hindenburg was elected President. In the same year, at Locarno, Germany signed with its former enemies an epoch-making treaty of permanent security. In 1926 war hatreds were so far extinguished that Germany was admitted to membership in the League of Nations. In the years immediately following, several conferences were held by the allied nations and Germany, to find a new and satisfactory basis for assessing Germany's war debt. In 1929 the Young Plan was adopted to supplant the Dawes Plan. See WAR DEBTS, for detailed analysis. E.D.F.

**Related Subjects.** The articles in these volumes referring to Germany are numerous, but the following classified index will make reference to them easy:

## CITIES AND TOWNS

|                       |         |
|-----------------------|---------|
| Berlin                | Hamburg |
| Bremen                | Leipzig |
| Cologne               | Lubeck  |
| Dresden               | Munich  |
| Frankfort-on-the-Main |         |

## HISTORY

|                          |                    |
|--------------------------|--------------------|
| Augsburg Confession      | Hapsburg           |
| Balance of Power         | Hessians           |
| Berlin, Congress of      | Hohenstaufen       |
| Counter-Reformation      | Hohenzollern       |
| Crusades                 | Holy Alliance      |
| Dawes Plan               | Holy Roman Empire  |
| Elector, German Imperial | League of Nations  |
| Franco-German War        | Locarno Agreement  |
| Free Cities              | Lützen, Battles of |
| Golden Bull              | Peasants' War      |
| Hanseatic League         | Pragmatic Sanction |

|                     |                     |
|---------------------|---------------------|
| Reformation, The    | Thirty Years' War   |
| Sadowa, Battle of   | Trent, Council of   |
| Schmalkaldic League | Triple Alliance     |
| Seven Weeks' War    | Vienna, Congress of |
| Seven Years' War    | World War           |
| Succession Wars     | Zollverein          |

Much of the history of the country is contained in the articles on the rulers or other distinguished people:

|                                     |                         |
|-------------------------------------|-------------------------|
| Bethmann-Hollweg                    | Hindenburg, Marshal von |
| Bismarck-Schönhausen                | Louis, the German       |
| Blücher, Gebhard von                | Luther, Martin          |
| Bulow, Prince von                   | Maria Theresa           |
| Charlemagne                         | Maximilian I            |
| Charles                             | Moltke, Count von       |
| Ferdinand I and II                  | Stein, Baron von        |
| Frederick I, Barbarossa             | Tilly, Count of         |
| Frederick I, II, and III            | Wallenstein, Duke of    |
| Frederick William I,<br>III, and IV | William I and II        |
| Henry III, IV, and VI               |                         |

## MOUNTAINS

|              |               |
|--------------|---------------|
| Alps         | Harz          |
| Black Forest | Riesengebirge |

## RIVERS

|         |       |
|---------|-------|
| Danube  | Oder  |
| Elbe    | Rhine |
| Main    | Spree |
| Moselle | Weser |

## STATES AND PROVINCES

|                      |                    |
|----------------------|--------------------|
| Baden                | Palatinate         |
| Bavaria              | Pomerania          |
| Brandenburg          | Prussia            |
| Brunswick            | Saxony             |
| Hanover              | Schleswig-Holstein |
| Hessen               | Silesia            |
| Mecklenburg-Schwerin | Wurttemberg        |
| Oldenburg            |                    |

**GERMICIDE, jur' mih side.** See ANTISEPTIC.

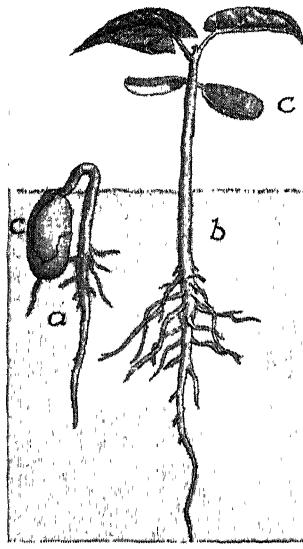
**GERMINATION, jur mih na' shun,** the process by which the germ, or embryonic plant, begins to develop into a mature plant. Germination is often used interchangeably with sprouting. The miracle of growth—the emergence of a tender green shoot from the moist, warm earth in the spring time, after the planting of the ripened seed—is one of the most familiar and yet one of the most wonderful facts in nature. What has taken place is the awakening to activity of the germ of life—the embryo, or kernel, of the seed. The embryo is itself a miniature plant, and in many cases it has a fairly definite set of organs—a short, rootlike member, actually growing into a root below, and often above into a subcotyledonary stem called the hypocotyl; one or two seed-leaves, called cotyledons; and a plumule, or seedbud.

There are three conditions which are generally necessary for the sprouting of a seed. These are warmth, moisture, and a supply of oxygen. Different plants vary in their temperature requirements, and the farmer must learn by experience when to sow the various grains and vegetables. Corn planted too soon will decay in the ground, but peas can safely be sown not long after the soil is free from frost. The following table shows the temperatures required by a few well-known plants; the degrees are on the Fahrenheit scale:

|                    | LOWEST  | HIGHEST | MOST FAVORABLE |
|--------------------|---------|---------|----------------|
| Barley . . . . .   | 32°-41° | 100.4°  | 84°            |
| Wheat . . . . .    | 32°-41° | 107.6°  | 84°            |
| Indian Corn . . .  | 49°     | 115°    | 91.4°          |
| Squash . . . . .   | 57°     | 115°    | 91.4°          |
| Muskmelon and .    | 60°     | 117°    | 93°            |
| Cucumber . . . . . |         |         |                |

Moisture softens the outer coat of the seed, swells the tissues of the embryo, and also conditions the solution of certain food materials present in the seeds so that they may be assimilated. Too little moisture and too much are equally injurious to growth, for the first condition retards germination, and the second causes many species to decay because of lack of air. A supply of oxygen is necessary, because without this gas, certain chemical changes which accompany growth cannot take place. In other words, seeds must respire to live actively. The time required for germination varies greatly with different plants. Seeds of trees and shrubs usually take more time to sprout than do those of grains, grasses, and vegetables; the ash and hornbeam, for instance, do not grow until the second spring after the sowing. Parsley seeds sprout in about two weeks, and those of grains, grasses, and many herbs of the pea family in from two to eight days.

**Examples of Germination.** The bean is a good example of those plants which have two seed-leaves (cotyledons), both of which rise above the ground during the growing process. First, the outer coat of the seed (the *testa*) splits open, and a radicle, or root part, pushes its way downward into the soil, soon developing a covering of fine root hairs. This is the beginning of the root system of the plant. Meanwhile, the cotyledons burst open, and as they rise from the ground, a green shoot unfolds between them, while the root develops branches



GERMINATION

Two stages in the growth of the bean. (a) Taproot; (b) hypocotyl (the portion of the stem below the cotyledon); (c) the cotyledon.

in the soil. Under the action of the sunlight, the cotyledons turn green, but as the nourishment stored in them is absorbed by the plant, they wither and fall. Their place, however, is taken by a pair of true leaves, which, with the developing root system, supply the young plant with food.

The pea, another plant with two seed-leaves, germinates differently, for its cotyledons remain in the ground while their nourishment is being absorbed, and the first leaf that appears above ground is a true leaf. The germination of seeds having but one cotyledon is illustrated by that of the Indian corn. Here the nourishment is stored at the large end of the kernel. As in case of the pea, the nourishment is absorbed while the seed-leaf remains underground, and the first leaf above ground is a true leaf.

B.M.D.

**Related Subjects.** The reader is referred in these volumes to the following articles:

Cell  
Cotyledon  
Roots

Seeds  
Spore  
Stem

**GERM PLASM.** See **EVOLUTION** (*The Factors of Evolution*).

**GERM THEORY OF DISEASE.** See **DISEASE** (*Disease in the Human Body*).

**GÉRÔME**, zhay rōm', JEAN LÉON (1824-1904), a French painter and sculptor, considered one of the most eminent artists of the late nineteenth century. He received practically all of his early training from Paul Delaroche; this was supplemented by extensive travel. His work is remarkable for perfect drawing and grouping, although critics consider his color often lacking in warmth. Most of his pictures are in French galleries, but he is also well represented in American collections, particularly the Metropolitan Museum, New York City. Some of his famous paintings are *Gladiators before Caesar*, *The Age of Augustus*, *Slave Market in Rome*, *Death of Caesar*, and *Duel after a Masked Ball*.

[With the article **CAESAR** is a faithful reproduction, in halftone, of the *Death of Caesar*.]

**GERONIMO**, je rōn' i mo (1834-1909), an Apache chief of the Chiricahua band, who, during the years 1884 and 1886, as the leader of a band of savages, made hostile raids into New Mexico and Arizona. General Crook forced him to surrender in 1886, but on the march to Fort Bowie, where imprisonment awaited them, the Indians escaped and renewed their depredations. The vigorous measures of General Miles, who replaced General Crook, resulted in the second surrender of Geronimo, who was sent to Fort Pickens, and later to Fort Sill, Okla. There he was held until his death. (See illustration, page 2791).

**GERRY, ELBRIDGE.** See **GERRymander**, subhead; **X Y Z CORRESPONDENCE**.

**GERRYMANDER**, *gair ih man' dur*, a word coined in the United States in 1812, defining an unnatural division of a state into districts to gain political advantage. When Elbridge Gerry was governor of Massachusetts, the legislature made a new division of the districts for the election of state senators, grouping the counties together that returned large Federalist majorities. By this means, the



Photo: Brown Bros.

**GERONIMO**  
(See article, page 2790.)

representation of the Federalist party in the legislature was reduced. The outline of one district, under the new law, was so unusual that it was not unlike the figure of some mythical animal. An editor drew the geographical figure and exhibited it at a dinner party. Some said it looked like a salamander. "No," said another, "it is a *gerrymander*." For years the word was used by the Federalists as a term of contempt for the governor and the Democratic legislature, which had established the

artificial redistricting of the state. The word has been incorporated into the language, and is used very generally, especially as a verb.

The most famous gerrymander in the United States since the original one of 1812 was the

**THE FIRST GERRYMANDER**

The misshapen district suggested to opponents of the responsible political party the addition of forked tongue, wings, and claws.

"shoestring district" (Sixth Congressional) in Mississippi. It was formed to minimize the negro vote, and consisted of all the counties in the state along the Mississippi River; it was about 300 miles long and only about twenty miles broad.

**Elbridge Gerry** (1744-1814), the governor of Massachusetts whose name is perpetuated in the word *gerrymander*, was born in Marblehead, Mass., was graduated at Harvard College in 1762, and died at Washington, D. C. At the time of his death, he was Vice-President of the United States, having been elected with James Madison. Gerry was a signer of the Declaration of Independence, a member of the United States Constitutional Convention, and a member of Congress for several years. In 1797 he was sent to France to establish diplomatic relations with that country (see X Y Z CORRESPONDENCE). His term as governor of Massachusetts was from 1810 to 1812.

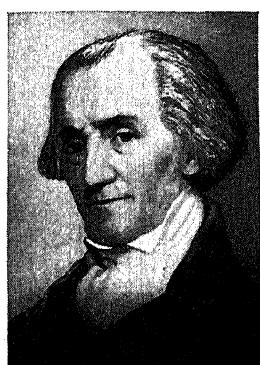


Photo: Brown Bros.

**ELBRIDGE GERRY**  
ELBRIDGE GERRY  
(See article, page 2791.)

**GERUND.** See **PARTICIPLE**.

**GERYON.** See **HERCULES** (Tenth Labor).

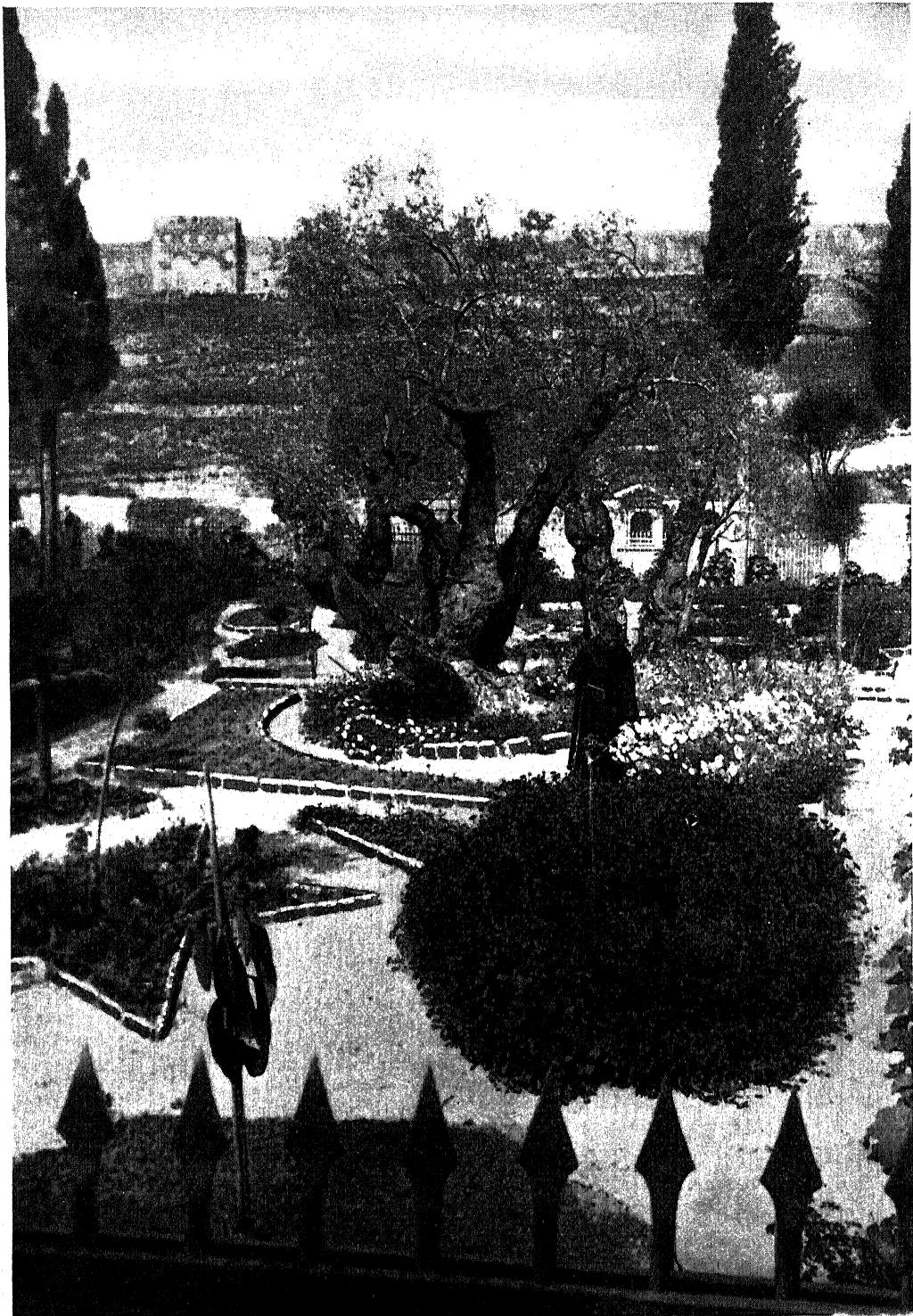


Photo U & U

**The Garden of Gethsemane.** It was to this garden, just outside the "Golden Gate" of Jerusalem, that Jesus went with his Disciples. Here He prayed while they slept, and here it was that Judas betrayed Him with a kiss. The ancient olive trees in the picture, while hardly the identical ones which sheltered Jesus that night so long ago, were undoubtedly grown from the same roots.

**GESNER,** DR. ABRAHAM, the scientist who named kerosene (which see).

**GESSLER,** a minor Austrian official. See TELL, WILLIAM.

**GESTALT,** *ge stahlt'*, PSYCHOLOGY. See PSYCHOLOGY (Modern Movements).

**GETHSEMANE,** *geth sem' a ne*, a beautiful garden filled with olive trees, located about a mile east of Jerusalem, between the River Kedron and the Mount of Olives. During His mission on earth, Jesus often retired to this spot for meditation and prayer. It is now forever sacred, because it was the scene of His agony, His betrayal by Judas, and His arrest. Although the exact location is not known, the Latins built a wall around a plot of ground, 140 by 150 feet, just across the river from Jerusalem, arranged it as a European garden, and preserved it as the sacred spot. The Greeks, envious of the Latins, enclosed a place a little north, beside the Virgin's tomb, and contend that this is the true Garden.

The "Cavern of the Agony" is a grotto beside the Garden, at the right of the Church of the Tomb of the Virgin. It was here that legend says the sweat of Jesus became as great drops of blood. Since 1392 the Grotto, and since 1681, the Garden, have been under the exclusive control of the Franciscans.

There are eight large olive trees in the Garden, with circumferences of twenty-four to thirty feet. They must have existed for at least thirteen centuries, because they never were subject to tax imposed upon all newly planted trees after the Mussulman conquest. It was not until 1848 that the Franciscans enclosed the Garden. A mass of rock marks the spot where Peter, James, and John slept, and there is a marker that is supposed to indicate the spot where Judas betrayed Jesus with a kiss. (See illustration, at left.)

**GETTYSBURG, BATTLE OF.** See WAR OF SECESSION.

**GETTYSBURG ADDRESS.** In ten sentences, containing only 267 words, spoken under the inspiration of a great and solemn assemblage, Abraham Lincoln gave to the ages America's noblest example of oratory. The occasion was the dedication of the National Cemetery on the site of the Battle of Gettysburg (see WAR OF SECESSION). It was a masterpiece of logic, faultless in sentence structure, forceful in its choice of words, and above all, breathed the purest patriotism—the kind which grips men's hearts and stamps immortal truths upon their minds. In the simple manner characteristic of the man, he said:

Fourscore and seven years ago, our fathers brought forth on this continent a new nation, conceived in liberty, and dedicated to the proposition that all men are created equal. Now we are engaged in a great civil war, testing whether that nation, or any nation so conceived and so dedicated, can long endure.

We are met on a great battlefield of that war. We have come to dedicate a portion of that field as a final resting-place for those who here gave their lives that that nation might live. It is altogether fitting and proper that we should do this. But in a larger sense we cannot dedicate, we cannot consecrate, we cannot hallow this ground. The brave men, living and dead, who struggled here, have consecrated it far above our poor power to add or detract. The world will little note, nor long remember, what we say here, but it can never forget what they did here. It is for us, the living, rather to be dedicated here to the unfinished work which they who fought here have thus far so nobly advanced. It is rather for us to be here dedicated to the great task remaining before us,—that from these honored dead we take increased devotion to that cause for which they gave the last full measure of devotion,—that we here highly resolve that these dead shall not have died in vain,—that this nation, under God, shall have a new birth of freedom,—and that government of the people, by the people, for the people, shall not perish from the earth.

[The reader is referred to the articles EVERETT, EDWARD; LINCOLN, ABRAHAM; and to illustration, page 2794.]

**GEYSER,** *gi' sur*, or *gi' zur*. In the volcanic regions of Iceland, New Zealand, and Yellowstone National Park, there are very striking exhibitions of the earth's internal heat, in wonderful natural fountains, called *geysers*, from which streams of boiling water and steam shoot high into the air at varying intervals. Geysers have often been compared to volcanoes, for they act much the same, but instead of molten rock, they shoot forth water containing mineral matter in solution.

**Origin and Action.** Geysers form along the lines of drainage, that is, near rivers and lakes, from the surface water which works down through cracks in the rocks and lava, until, at some unknown depth, it comes in contact with rocks sufficiently hot to boil it. The rocks are much hotter than is necessary to heat the water to the boiling point, and as more water trickles down, the pressure of the cooler surface water becomes very great on the boiling water beneath. (See page 2796.)

When the pressure of the steam formed at the bottom becomes stronger than the pressure from above, the steam must escape, so it forces the water above it up through an opening in the rocks, called a *tube*. As soon as a little of the water overflows upon the surface of the earth, the pressure below is relieved, and the steam shoots out, taking a great amount of water with it. The eruption occurs very suddenly, and after it ceases, much of the water which falls around the geyser evaporates, leaving deposits of silica or lime carbonate that often take on beautiful and fascinating forms.

Some geysers, such as the Giantess in Yellowstone National Park, never form cones, but appear as pools of wonderfully clear water, except when in action. Very little water is left after an eruption in those which have

FOURSCORE AND SEVEN YEARS AGO OUR FATHERS BRIGHTENED  
EARTH ON THIS CONTINENT AND NATION CONCEIVED IN  
LIBERTY AND DEDICATED TO THE PROPOSITION THAT ALL  
MEN ARE CREATED EQUAL.

NOW WE ARE ENGAGED IN A GREAT WAR, TESTIMONY  
TO LIBERTY THAT ANY NATION SO COMMITTED AND SO  
DEDICATED CAN LONG ENDURE.

WE ARE DEDICATING ON A GREAT BATTLEFIELD OF THIS WAR, THAT  
COUNTRY TO DEDICATE A PORTION OF THAT FIELD AS A CIVIL  
TESTIMONY FOR THOSE WHO GAVE THEIR LIVES THAT LIBERTY AND  
THIS UNION LIVED AND PROPER THAT WE SHOULD DEDICATE IT IN  
STANZA WE GIVE YOU DEDICATE WE GIVE YOU DEDICATE WE GIVE YOU DEDICATE  
THE BRAVE MEN LIVING AND DEAD WHO STRUGGLED HERE, WE DEDICATE IT IN  
STANZA ONE DOOR PENTER TO ADD OR DESTRACE THE WORD LIBERTY AND FOR LONG  
REMEMBER THEM WE SAY HERE, BUT IT CAN NEVER FORGET THEM INDIRECTLY WE  
FOR US, WE LIVING RATHER TO BE DEDICATED HERE TO THE INFINITELY DEDICATE WHICH  
WE ARE DEDICATING ON A GREAT BATTLEFIELD OF THIS WAR SO NOBLY ADVANCED IN STANZA ONE DEDICATE  
WE ARE DEDICATING TO THE BRAVE MEN REMAINING WE DEDICATE IT IN  
STANZA TWO DEDICATE DEVOTION TO THEM CAUSE OF LIBERTY AND GATE THEM  
TAX FREE TESTIMONY OF DEVOTION THAT WE HEEVE EIGHT, EIXSCHE INN TELL  
THAT AND SLOWLY WE DIED IN VALA MONT THIS NATION, UNDER GOD, STANDING ON  
THE BATTALION OF FREEDOM, AND THAT GOVERNMENT OF LIBERTY AND JUSTICE,  
FOR ALL THE PEOPLE, SHALL NOT PERISH FROM THE EARTH.

*Abraham Lincoln*

UNION STATE MONUMENT 1863.

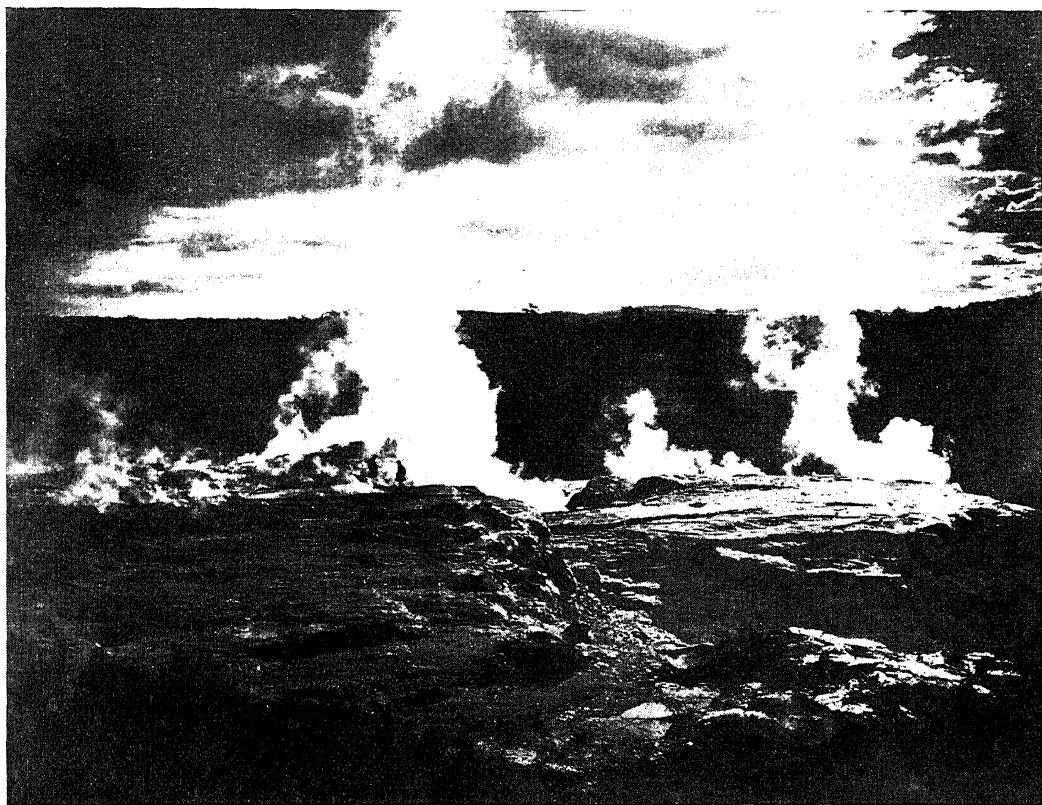


Photo: U &amp; U

## ON THE OTHER SIDE OF THE WORLD

The Polutu Geyser, on North Island, New Zealand, in action. Its spray is shot many feet into the air. [In the article Yellowstone Park, will be found an illustration of one of the world's most noted geysers, "Old Faithful."]

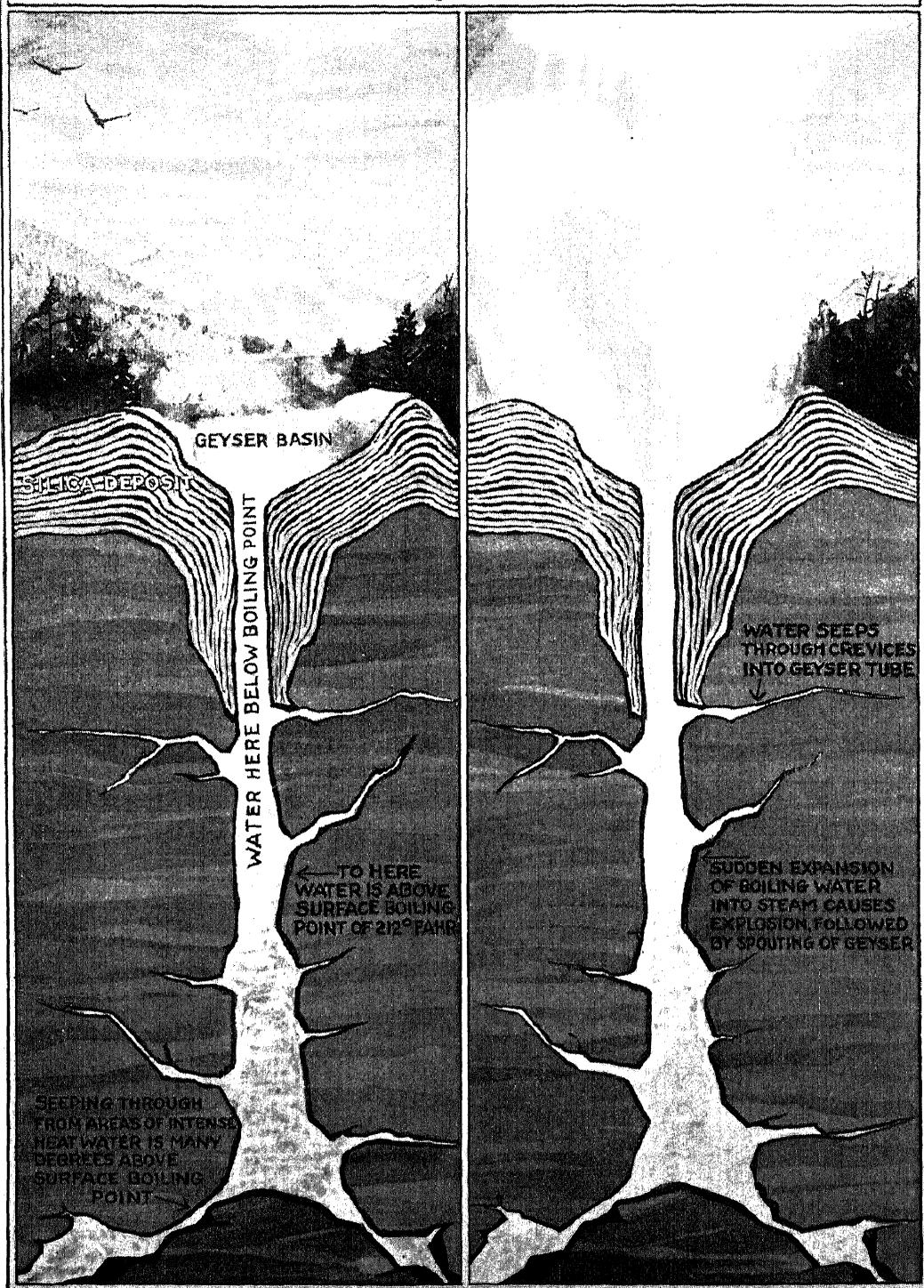
cones, except in such cases as that of the tiny Model, also in Yellowstone National Park, where all the water ejected falls back into the cuplike cone and returns to the depths of the earth to be reheated. Eruption of these geysers is caused by the gradual filling of the crater with water, which is forced up by the steam generated in the cavity below. The water prevents the escape of the steam, and as it rises in the crater, the pressure of steam below increases. Finally, the water reaches the top of the crater, and begins to overflow. With the overflow, the pressure in the crater lessens, and the steam under high pressure expands with such force as to drive all the water out of the crater, often throwing it over a hundred feet into the air. After the water has been expelled, a flow of steam follows for several minutes. The geyser then becomes quiet and remains in this state until the crater is again filled, when another eruption occurs.

In course of time, geysers cease to act and become hot springs. However, this process is very slow, and the formation of new geysers offsets the decay or drying up of old ones, so that it will be thousands of years before they

cease to exist. The prevalent idea that geysers erupt at regular intervals is false, although a few geysers, such as Old Faithful in Yellowstone Park, send forth their showers at quite definite periods.

**Their Distribution.** In Iceland the volcanic forces are still active, and in New Zealand the occasional eruption of Tarawera shows that molten rock still exists; but in Yellowstone National Park, where there are sixty active geysers located on an elevated volcanic plateau, there are no evidences of fresh lava flow. In the barren lava fields of Iceland, which is well named the "land of frost and fire," are located the Geyser and the Strokr, the two famous geysers of that region, seventy miles from Reykjavik, Iceland's capital. In strong contrast is the location of the New Zealand geysers, which are situated in a country clothed in luxuriant vegetation. The delicate "pink and white terraces," which rise like stairways of beautifully sculptured marble above the dull green waters of Lake Rotomahana, in that country, were formed from the Terata geyser, standing like a fountain at the head of the stairway.

# DIAGRAM of a GEYSER



Yellowstone National Park contains the largest and most active geyser region in the world. Old Faithful is the most famous of all geysers. The Giantess, in the same park, has the largest crater; the Giant throws the highest column of water.

R.H.W.

**Related Subjects.** The reader is referred in these volumes to the following articles:

Iceland  
New Zealand

Silica  
Yellowstone National Park

**GHATS, OR GHAUTS,** *gawz*, two ranges of mountains running parallel with the east and west coasts of India, generally known as the Eastern and Western Ghats. The Western Ghats are more continuous than the Eastern range, and extend from the River Tapti to Cape Comorin, the most southerly point of the peninsula, with peaks varying from 4,000 to 8,700 feet in height. The Eastern Ghats, the main part of which lies between Orissa and Coimbatore, have an average height of 1,500 feet.

The term *ghats* is also applied to landing places by the side of Indian rivers, with broad flights of stairs leading to long, high rest-houses or temples. Up and down these ghats, especially those on the banks of the sacred River Ganges, thousands of Hindus pass daily to and from their baths in the holy waters. See **GANGES RIVER**.

**GHAUTS**, a variant of Ghats (which see).

**GHEBERS,** *ge' burz*, OR **GABERS,** *ga' burz*, is a name applied to the followers of the ancient Persian religion of Zoroaster. When the Mohammedans invaded Persia, in the seventh century, the Ghebers were driven to the western coast of India, where they are now known as the *Parsees* (which see).

**GHENT**, called *gent* in America, but *gong* in Europe, is the capital of the province of East Flanders, in Belgium. It is situated at the junction of the Scheldt and Lys rivers, thirty-one miles northwest of Brussels. Like all Belgian cities, it is intersected by a network of streams and canals, crossed by more than 200 bridges. The older portion of the town is of great interest to tourists, having a medieval aspect and possessing many buildings of historic interest. These include the cathedral, part of which dates from 941, and the sixteenth-century town hall, the finest example of Gothic architecture in Belgium.

Ghent was founded in the seventh century by Baldwin, the first Count of Flanders, and it grew in importance until, in the fifteenth century, it became the chief center of European textile industries. Since the days of its foundation, Ghent has been a center of strife and war. In the fourteenth century, the wealthy merchants of the city maintained an army of 20,000 men (for history, see **FLANDERS**; also **BELGIUM**). During the World War, the city was occupied by the Germans, without oppo-

sition; by avoiding bombardment, the citizens preserved their historic buildings.

The treaty which ended the war of 1812, between Great Britain and the United States, was signed here (see **GHENT, TREATY OF**).

Although Ghent has greatly declined in commercial importance, the city is still noted particularly for its linen weaving and for its far-famed flower nurseries. Population, 166,000.

**GHENT, TREATY OF**, the treaty which ended the War of 1812 between Great Britain and the United States, was signed December 24, 1814, and ratified February 17, 1815. The American negotiators were John Quincy Adams, James A. Bayard, Henry Clay, Jonathan Russell, and Albert Gallatin. The terms of the treaty restored all territory to its ownership previous to the war, appointed a commission to settle matters relating to the international boundary, and bound both America and England to use their utmost influence to stamp out slavery. Many points which afterward caused friction were not settled; it was generally felt that the United States negotiators had not strongly insisted on a cessation of impressment of American seamen, one of the chief causes of the war. However, that issue never again appeared in the relations of the two countries. The rights of Americans to participate in the Newfoundland fisheries were also overlooked. These matters were settled by subsequent negotiation. See **WAR OF 1812**.

**A Needless Battle.** A notable incident in military history occurred in connection with this treaty. More than two weeks after it was signed, the Battle of New Orleans was fought (January 8, 1815), the news of peace not having reached the United States.

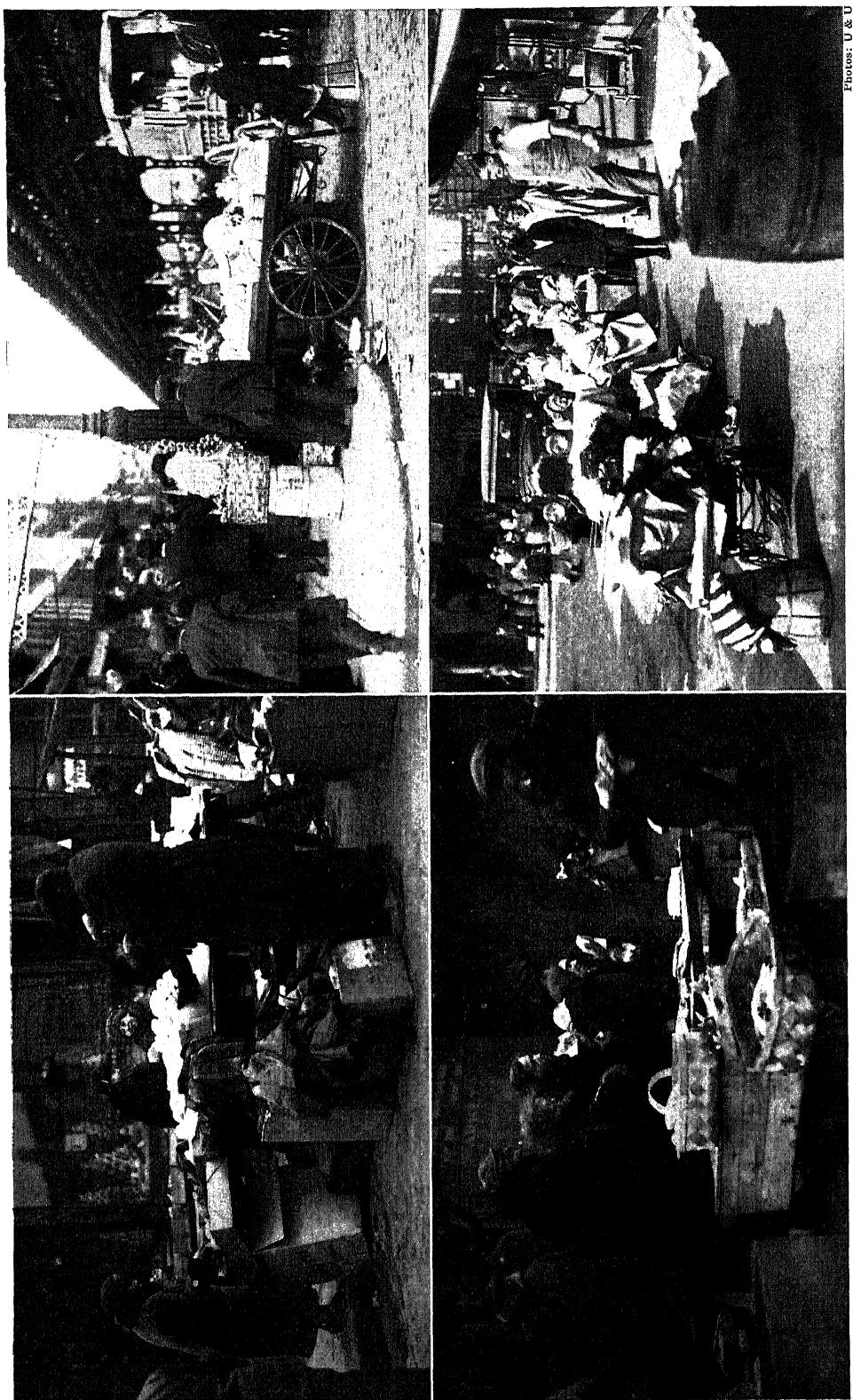
**GHERKINS,** *gur' kinz*. See **CUCUMBER**.

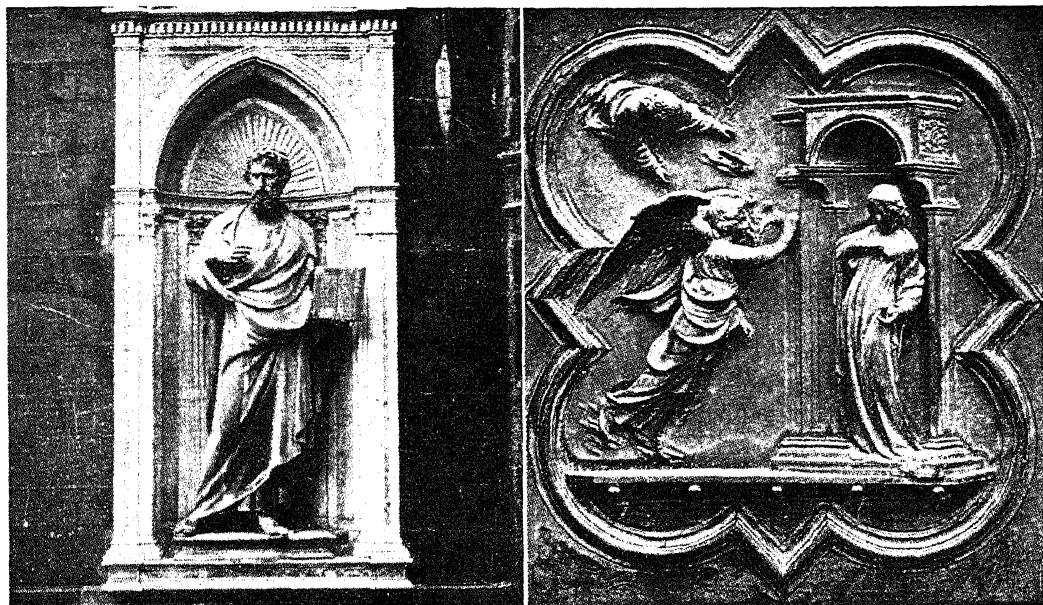
**Ghetto,** *get' o*. In the Middle Ages, the Ghetto was the Jews' quarter of a large town, outside of which they were not permitted to take up residence. The name now has no legal significance, but is popularly applied to the section of a large city occupied of their own choice by Jews of the poorer classes. The largest and most densely populated Ghetto in the world is located on the "East Side" in New York City, where a single city block contains 3,000 to 5,000 population. Six hundred persons are often housed in one tenement building. The population of the New York Ghetto is estimated at 350,000.

The Ghetto originated in Rome, and was instituted by Pope Paul IV. He allotted the distinct quarter, comprising a few narrow, unhealthful streets on the banks of the Tiber River, and extending from the bridge Quattro Capi to the present Place of Tears. Walls and gates that could be guarded enclosed the "Jews' Suburb." On the twenty-sixth of July,

Photos: U & U

**Ghetto Scenery and Personalities.** These views picture the methods of trade in the congested Ghetto district of any great metropolis. One may see lines of carts standing close together, each presided over by a "merchant." In one cart may be calico only; in another, cheap ribbons; in another, a different article—only one kind of goods in one "store." Sometimes wares are displayed on boxes. The four views above are from photographs taken in New York City.





THE ART OF GHIBERTI

At left, Saint Matthew; right, The Annunciation. Both are in bronze, and are to be seen in galleries in Florence.

1556, the Jews entered the Ghetto, weeping and wailing, like their ancestors when taken into the Captivity. In the eighteenth century, Innocent XIII decreed that the Jews should have no trade or profession other than traffic in rags, old clothes, and broken iron. In 1740 Benedict XIV permitted them to add to this the trade in new cloth wares, which in Rome they carry on to the present day. Pius IX was more liberal than his predecessors, for he ordered the walls of the Ghetto pulled down, and the Jews were then at liberty to reside where they pleased in Rome.

The Ghetto of London has been presented in fiction by Zangwill in his *Children of the Ghetto*, and the New York East Side life has been depicted in the works of Henry Harland, Abraham Cahan, and Hutchins Hapgood. See AMERICANIZATION.

L.L.B.

**Derivation.** The word *ghetto* was probably from the Talmudic *ghet*, which signifies *separation*.

**GHIBELLINES, gib' el linz.** See GUELPHS AND GHIBELLINES.

**GHIBERTI, ge bair' te, LORENZO** (1378-1455), an artist who holds first rank, with his friend Donatello, among the Italian sculptors and goldsmiths of the Renaissance. His art has been perpetuated by his bronze gates for the baptistry of Florence, which in beauty of ornamentation and perfection of form and finish are counted among the finest works of art in Italy, and far surpass anything of the kind attempted since the days of the ancient Greeks. A century after their completion,

Michelangelo pronounced them "worthy to be the gates of Paradise," and they still compel the admiration of the visitor. The first gate, upon which Ghiberti was engaged for twenty years, consists of twenty-eight panels, representing incidents in the lives of Christ, the fathers of the Church, and the Evangelists. So greatly was this admired that the artist received the order for a second gate, which took as much time to complete; the subjects for it were taken from the Old Testament.

Next to the gates for the baptistry, Ghiberti's chief works still in existence are his three statues of Saint John the Baptist, Saint Matthew, and Saint Stephen. In the Church of San Michele, at Florence, are to be found bas-reliefs, statues, and some excellent painted glass windows. He is also famed as an architect, but his skill as a sculptor and goldsmith far eclipsed his other attainments. Ghiberti died, at the age of seventy-seven, in his native city, Florence.

**GHIRLANDAJO, geer lahn dah' yo, DOMENICO** (1449-1495), an eminent Florentine painter of the Renaissance. *Ghirlandajo*, which means *garland-maker*, was a nickname that clung to Domenico from the employment of his father, who fashioned the metallic garlands worn by the Florentine maidens. Not until the age of thirty-one did the artist begin his life work, and in a brief period of fourteen years he became one of the most proficient painters of his time, presenting the life of the Renaissance as he saw and knew it in the town which he knew and loved best—his native Florence.



GIANTS' CAUSEWAY (See next page.)

He had a happy faculty of bringing many notable personages of his day into his paintings, which makes his work invaluable to the student of his time.

**Representative Works.** His first work of importance, the frescoes in the Sistine Chapel, are notable for their excellence in composition and perspective. Among others are the frescoes and an altarpiece in the Sassetti Chapel of the Trinity Church, and the frescoes in the choir of Santa Maria Novella, in Florence; and his paintings, *Coronation of the Virgin* and *Adoration of the Kings*. Of several portrait heads, one of the best known is in the Morgan collection, New York.

**GHOSTS**, shadowy figures of the dead brought into fancied reality in the imaginations of living persons. The belief in ghosts has furnished topics for countless gruesome stories and has led to many superstitious fears. They have been credited with remarkable powers, and in the past, terror was felt over the almost certain return of the spirit of anyone who died a violent death or who was concerned with a murder. Tales of haunted houses show that this feeling still exists, but in most civilized countries, nowadays, ghosts merely furnish a topic which permits of unlimited play of the imagination in stories told at dusk or in the dim firelight's glow.

Various theories have been advanced concerning belief in ghosts. It has been suggested that it arose from dreams. A dream in which

a dead person figures may have been so realistic that the dreamer believed the dead had really come back in person; or the dreamer may have believed that while sleeping his own soul left his body and visited and talked with the dead. At any rate, the belief in the return of the dead in the form of ghosts has played an important part in religious beliefs, and various religious theories have developed therefrom, such as ancestor worship, belief in immortality, witchcraft, nature worship, and totemism. Akin to the ghost belief is the tenet of spiritualism, that spirits of the departed commune with the living. North American Indians had a religious dance called the *ghost dance*, performed at night, and for which a white cloak was worn. The superstitious fears of negroes are well known.

**Ghosts on the Printed Page.** One of the most famous ghosts in literature is that of Hamlet's father, in Shakespeare's tragedy *Hamlet*. Marley's Ghost in Dickens' *The Christmas Carol* changes a miserly, hard old man to a cheerful, helpful giver.

**Related Subjects.** The reader is referred in these volumes to the following articles:

Immortality  
Spiritualism

Totem  
Witchcraft

**GHURUSH**, the Turkish name for the piaster (which see).

**GIANT MOUNTAIN.** See ADIRONDACK MOUNTAINS.

**GIANTS**, *ji' antz*, a word commonly applied to unusually tall men and women. The average height of men throughout the world is about five feet five inches; but each race has an average height of its own, which changes little from generation to generation, and which often varies considerably from the general average of all men.

Machnow, a Russian, born at Charknow, was exhibited in London in his twenty-third year, in 1905; he was then nine feet three inches in height and weighed 360 pounds. From his wrist to the tip of his second finger, he measured two feet. Chang-wu-gon, a Chinese giant, was seven feet nine inches high; Anna Swan, a native of Nova Scotia, and her husband, Captain Bates, a native of Kentucky, each measured over eight feet. Men of similar proportions are seen occasionally to-day in traveling circuses.

It was the general belief of the ancients that the human race of their day had degenerated, the men of primeval ages having been of so far greater stature and strength as to be gigantic. The idea conveyed by the word *giants* in classic mythology is that of beings more or less manlike, but enormous in size and strength. Giants of Greek mythology were believed to personify the elements of nature, and were said to have sprung from the blood of Uranus (Heaven), which fell into the lap of Gaea (the Earth).

Giants figure largely in Celtic and Scandinavian mythology and legends. The giants Fingal and his son Ossian belong to the legends of the Irish. The giants of the Welsh are familiar to everyone through the achievements of Jack the Giant Killer.

Races of giants are first mentioned in the Bible in *Genesis* VI, 4. Og, the king of Bashan, had a bedstead nine cubits long, a cubit being then 17.58 inches. Goliath, who measured six cubits and a span, and who was slain by David, is the most celebrated of the giants mentioned in the Bible.

C.W.

From a medical standpoint, excessive stature is an abnormal condition believed to be connected with improper functioning of a ductless gland in the brain. See **GLANDS** (*Ductless Glands*).

**GIANTS' CAUSEWAY**, a remarkable group of basaltic rocks on the north coast of County

Antrim, Northern Ireland. The causeway proper is a promontory formed of about 40,000 columns, fitting into each other perfectly and jointed horizontally. Some of the pillars are twenty feet in height, and vary in diameter from fifteen to twenty inches. Different groups are known as the *Wishing Chair*, *Lady's Fan*, *Giants' Loom*, *Giants' Organ*, etc. The peculiar pillar-like construction of the rocks is declared by geologists to result from contraction in the cooling of the lava of which they are composed. The Giants' Causeway derived its name from the legend which ascribes its construction to Finn M'Coul, or Fingal, who bridged the channel from Ireland to Scotland in order that the giants might pass from one country to the other. See illustration, page 2800.

**GIGANT SILKWORMS.** See **MOTH** (*Moth Families*).

**GIBBON**, *gib' un*, a small, tailless anthropoid, or manlike, ape, the lowest of the group which also includes gorillas, chimpanzees, and orangutans. It is found in all parts of the East Indies, where it inhabits the forests, living almost entirely in the trees and traveling with great rapidity through the tangled growth. Its color is black, with a white fringe or beard surrounding the face. Gibbons are extremely awkward on the ground and move with difficulty, using their extremely long arms to balance themselves, but never creeping on all fours. At night they sleep curled up in a ball in the branches of trees or on rudely constructed platforms.

Their natural food consists of fruit and nuts, though they frequently kill and eat small birds. They are easily tamed, and when in captivity soon acquire a taste for all cooked foods. The long-armed gibbon of Sumatra is said to display wonderful agility in springing from tree to tree, clearing with ease a space of forty feet. In their native haunts, gibbons are very noisy, chattering incessantly; they are particularly so in the early morning, when they greet daylight with a concert of long-drawn-out "wa-hoos." The origin of the name is unknown. See **APE**.

M.J.H.

**Scientific Names.** Gibbons belong to the subfamily *Hylobatinae* of the family *Simiidae*. They are placed in two genera, *Hylobates* and *Sympalangus*.

**GIBBON, EDWARD** (1737-1794), was an English historian whose reputation in connection with a great history of the Roman Empire



A GIBBON

The original of this photograph was captured in Siam and sent to the zoo in Washington, D. C.

makes his fame secure. He was born in Putney, Surrey. Owing to much illness in childhood, his education was irregular. He entered Magdalen College, Oxford University, in 1752, and was expelled after fourteen months on account of his profession of the Roman Catholic faith. He soon renounced this creed, doubtless influenced by the arguments of the Calvinistic minister at Lausanne, under whose instruction he was placed following his expulsion from Oxford. In 1758 he returned to England, and in 1774 was elected to Parliament.

**The "Decline and Fall."** Gibbon's life work was the *History of the Decline and Fall of the Roman Empire*, which is considered not only one of the greatest histories ever written, but a remarkable literary achievement. While it has been attacked in minor points, in essentials it is still the standard authority for the period it covers. It is really a history of the civilized world for the thirteen centuries during which paganism was weakening and Christianity was gaining a foothold. An important criticism is that, owing to the author's lack of religious belief at the time the history was written, he belittled the influence of Christianity as a civilizing factor. Byron termed Gibbon "the lord of irony," but it is evident that Byron was prejudiced. Some critics consider the historian at his best in his autobiography, which was published after his death under the title, *Memories of My Life and Writings*.

**GIBBONS, JAMES** (1834-1921), a Roman Catholic churchman of wide scholarship and influence, the second American to be created a cardinal. He was born in Baltimore, but began his education in Ireland, where he remained until he was fourteen years of age. Completing his studies at Saint Charles College, Maryland, and at Saint Mary's Seminary, Baltimore, he was ordained a priest in 1861. He began his work as assistant in the parish of Saint Patrick's, Baltimore, was transferred to Saint Bridget's, in Canton, a suburb of Bal-



Photo: Brown Bros.

EDWARD GIBBON

"His writing was as poetical as a picture."



Photo: Brown Bros.

CARDINAL GIBBONS

timore, and later became secretary to Archbishop Spalding. Through the offices of bishop and vicar apostolic of North Carolina, bishop of Richmond, and coadjutor archbishop of Baltimore, he rose to the rank of archbishop of Baltimore, succeeding Archbishop Bailey in that dignity in 1877. Nine years later, he attained the highest honor of his career—his appointment as cardinal by Pope Leo XIII. In 1887, the year following, Cardinal Gibbons visited Rome and was formally inducted into membership in the College of Cardinals (see CARDINAL). Throughout America he was known as a man of broad enlightenment and progressive ideals.

G.W.M.

Cardinal Gibbons was the author of *The Faith of Our Fathers, Our Christian Heritage*, and *The Ambassador of Christ*.

**GIBBOUS, gib' us, MOON.** See Moon (Phases of the Moon).

**GIBEON**, a town in Palestine, a few miles northwest of Jerusalem. It was here that Joshua commanded the sun "to stand still upon Gibeon and thou, moon, in the valley of Ajalon" (*Joshua X, 12*). A small village with an old church now stands upon the ancient site.

**GIBRALTAR, jib rawl' tur**, a strong fortress situated on a rocky peninsula near the southernmost point of Spain. It is called the "Key to the Mediterranean." With a small town at the base of the rock, it forms a British colony, having been captured by English and Dutch forces in 1704, and assigned to Britain by the Treaty of Utrecht in 1713, at the close of the War of the Spanish Succession (see SUCCESSION WARS).

The Rock of Gibraltar rises 1,408 feet from the water and overlooks the narrow strait connecting the Mediterranean Sea with the Atlantic Ocean (see subhead, below). Britain's territory comprises nearly two square miles. A permanent military and naval force of about 3,500 is maintained.

The strait is from nine to thirteen miles wide; all vessels passing through it come under the muzzles of the huge guns of the fortress. The rocky promontory on which the fortress stands is connected with the mainland by a low sandy isthmus one and a half miles long and three-fourths of a mile wide. This strip forms a "neutral zone" between Spain and Britain's rock, and the approach is guarded by guns and mines. Guns of the largest caliber and newest design also protect the sea front, the rock being inaccessible. Since the development of modern implements of war, it is recognized that Gibraltar is not the impregnable post of times past.

Gibraltar, seen from the sea, appears to be a dark, somber, and forbidding mass of marble, but hidden from sight from the strait are beautiful, grassy, wooded glens where flowers

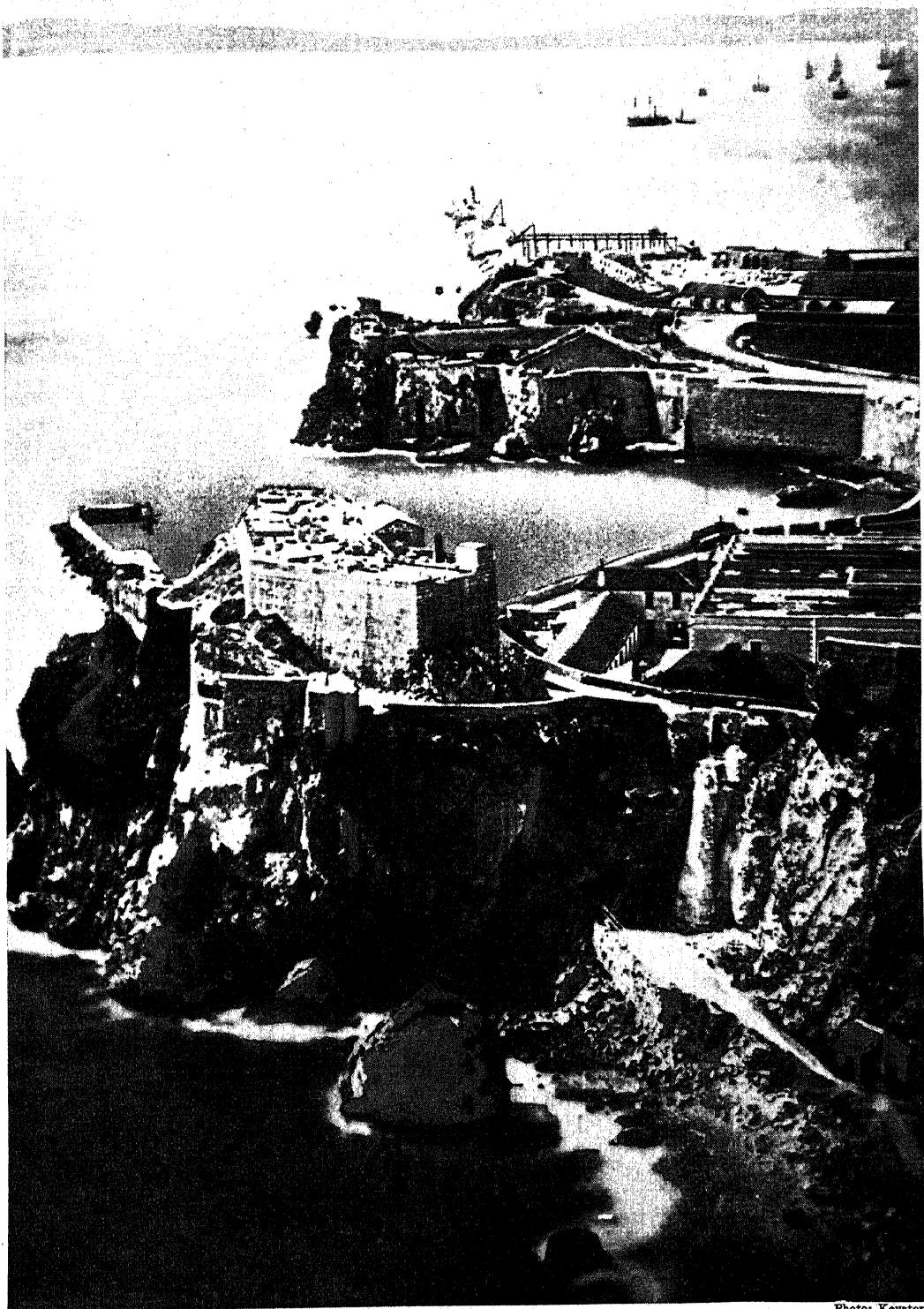


Photo: Keystone

**Viewed from an Airplane.** The Rock of Gibraltar has long signified strength and reliability. From above, the scene emphasizes the traditional belief, for the fortifications are plainly seen. However, against modern war machinery there is little defense, if once an enemy can get within range. In the distance is the shore of Africa.

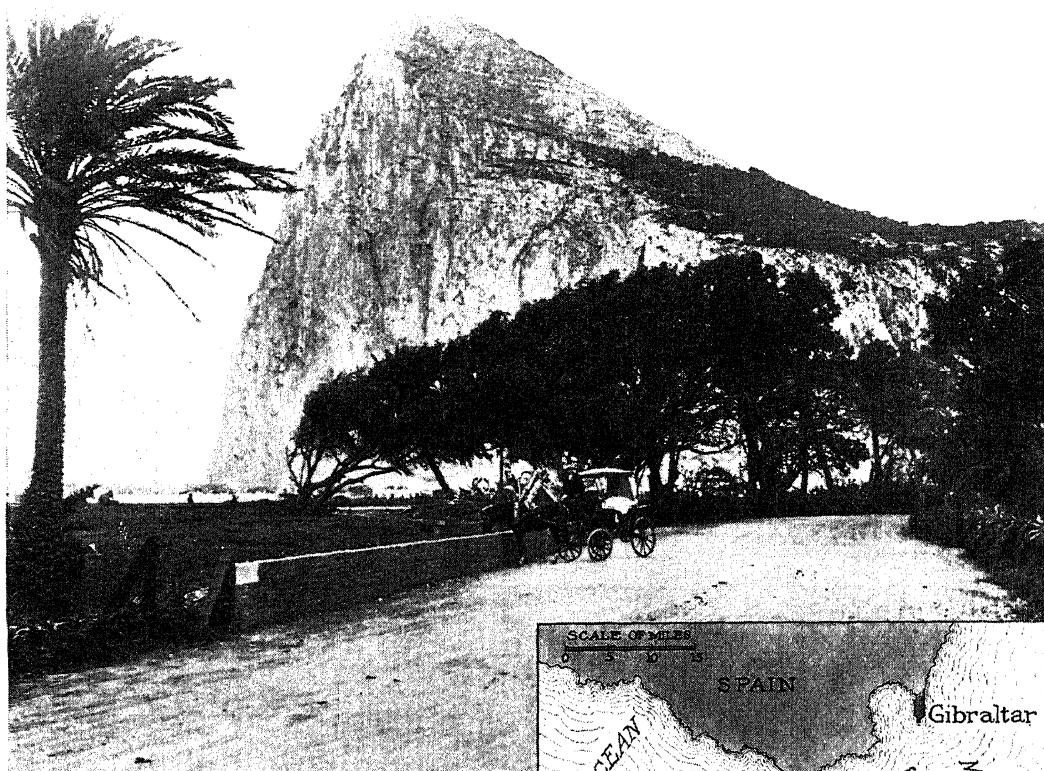


Photo: U &amp; U

**FROWNING GIBRALTAR**

"A crouching lion between the Atlantic and the Mediterranean," once the western outpost of civilization. Above is an unusual view, from the land side.

grow, and where game birds are found in large numbers. The permanent population of the British territory and of the neutral zone is about 17,000, chiefly descendants of Spanish and Italian settlers.

**Strait of Gibraltar**, the narrow channel between the "Pillars of Hercules," connecting the Mediterranean Sea and the Atlantic Ocean, and separating Spain from the northern coast of Africa. It is forty miles long and varies in width from nine to thirteen miles. There is practically no tide in the Mediterranean, and it has been found that there is a continuous under-current flowing westward through the strait, carrying the surplus waters of the landlocked sea into the ocean. See HERCULES, PILLARS OF.

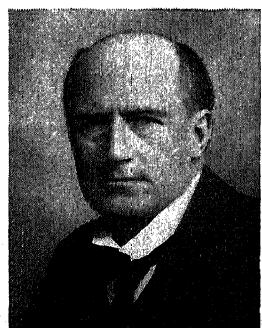
**GIBRALTAR OF AMERICA.** See QUEBEC (city).

**GIBRALTAR OF THE EAST.** See ADEN.

**GIBSON, CHARLES DANA** (1867- ), an American illustrator and artist, famous for his drawing of a characteristic society woman which has become known as the "Gibson Girl." He was born in Roxbury, Mass., studied at the Art Students' League, New York, under Saint Gaudens, and under Julian in Paris, and later went to London and Munich for



further work. He first achieved prominence by his illustrations in *Life*, the *Century*, *Scribner's*, and *Harper's* magazines. He is acknowledged to be one of the greatest living masters of black and white, and is widely known through his humorous, inoffensive ridicule of the shams of society. At one stage in his career, *Collier's Weekly* secured exclusive control of his services for a year at a salary of \$100,-000. In 1905 he discontinued illustrating for a time, and studied painting in Europe; in 1920 he purchased the controlling in-

Photo: Brown Bros.  
**CHARLES DANA GIBSON**

terest in *Life*, one of America's most notable humorous illustrated weeklies, published in New York.

**What He Wrote.** Some of Gibson's published works are *The Education of Mr. Pipp*, *A Widow and Her Friends*, *People of Dickens*, and *The Social Ladder*.

GIBSON,  
JOHN. See  
SCULPTURE  
(England).

GIDEON, *gid' e un*, the fifth judge of Israel, who was called by an angel of God to deliver his people from the Midianites, who were oppressing them. Going to battle with only 300 followers, each armed with a sword, trumpet, and earthen pitcher containing a lamp, he gained a splendid victory, with God's help, by attacking the enemy's camp at night (*Judges* vii, 19). Gideon long remained



one of the greatest of the heroes of the Jewish people.

Gideons Band, a society of Christian commercial traveling men, formed at Boscobel, Wis., in 1899, to promote the work of God by holding meetings in hotel lobbies and various churches. They publish a monthly magazine, *The Gideon*, in Chicago, and in 1908 began placing Bibles in the guest rooms of hotels. This work has grown until, at the present time, over 300,000 Bibles have been placed, mainly in the United States, although they are extending their work to Canada and England. It is planned ultimately to place a Bible in every hotel room in every English-speaking town or city.

GIEKE, MOUNT. See CAVELL, EDITH.

GIFT OF THE RIVER. See NILE.

GILA, *he' lah*, CLIFF DWELLINGS. See MONUMENTS, NATIONAL; NEW MEXICO (National Monuments).

GILA MONSTER, one of the largest of the lizard family in North America, and the only poisonous lizard found in the United States. It lives in the deserts of Arizona, New Mexico, and Texas, deriving its name from its discovery near the Gila River in Arizona. The Gila monster grows to a length of two feet, and has a thick, flattened body, which it drags over the ground with its short, stout legs. Its skin is covered with fine tubercles, and in color is a mixture of black and pink, yellow or orange. It has poison glands in the lower jaw, but the effect of its bite is a matter of dispute. It is now supposed to be non-injurious to a healthy person, but is probably fatal to small mammals, causing paralysis of the breathing organs. The Gila monster eats frogs, insects, and eggs of birds and reptiles, and stores up fat in its tail. It can live for months without eating, the tail meanwhile growing smaller. These reptiles re-

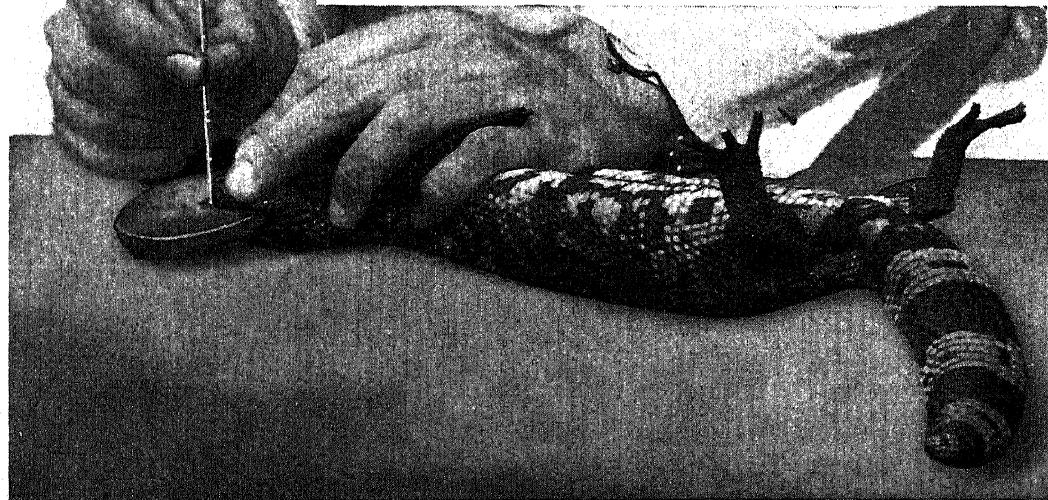


Photo: Keystone

**Extracting Poison from a Gila Monster.** A disc of rubber is given the lizard on which to bite. In doing this, it exudes its poison, which the man sucks into a glass tube.



Photo: Visual Education Service

## ANOTHER VIEW OF THE GILA MONSTER

produce from eggs, which are laid in the sand by the female and are hatched by the heat of the sun. See LIZARD.

L.H.

**Scientific Name.** The Gila monster belongs to the family *Lacertidae*. Its scientific name is *Heloderma suspectum*.

**GILA RIVER**, a tributary of the Colorado River, which has its source in the Sierra Madre Mountains in New Mexico and flows in a westward direction through mountains and valleys, across Arizona, and empties into the Colorado at the southeasternmost point of California. The ruins of stone dwellings and indications of irrigation canals along the banks of the Gila show that the region was formerly inhabited by a partly civilized race, the historically interesting and mysterious Cliff Dwellers (which see).

**GILBERT, ALFRED.** See SCULPTURE (England).

**GILBERT, SIR HUMPHREY** (1539-1583), one of the earliest of North American colonizers, first won fame as an English navigator and explorer. During early manhood, he attained distinction in the English army. In 1578 he received a commission from Queen Elizabeth to conduct an

expedition in search of a new route to India, a little known land in which he had become interested. The history of this voyage is obscure, but it availed nothing, as he returned to England the next year, having lost one of his chief ships and one of his bravest captains. Undaunted, however, he started out in 1583 in command of a second expedition, accompanied by his half-brother, Sir Walter Raleigh, who owned the largest ship, and who turned back two days after their departure from Plymouth. Gilbert went on, and this time succeeded in planting a colony near Saint Johns, Newfoundland. After taking formal possession, in the queen's name, he proceeded southward, encountered a storm, and was never heard from again. See NEWFOUNDLAND (History).

**GILBERT, WILLIAM.** See MAGNET AND MAGNETISM; ELECTRICITY.

**GILBERT, SIR WILLIAM SCHWENK** (1836-1911), an English dramatist who, in collaboration with Sir Arthur Sullivan, a composer, produced some of the world's most popular light operas. Theirs was the most successful artistic partnership in history, and it also proved to be an unusual financial success.



Photo: Brown Bros.  
SIR HUMPHREY GILBERT  
From a painting from life.

Sir Gilbert, who was born in London, studied at London University and later was admitted to the bar. He was knighted by King Edward VII in 1907. When *Fun* was first published, in 1861, it secured a reputation for him, chiefly by reason of his *Bab Ballads*. His first writing for the stage was entitled *Dulcamara; or, The Little Duck and the Great Quack*. However, his real success began when he entered into a producing partnership with Sir Arthur Sullivan. Their first operetta was *Trial by Jury*. Then followed others which ever since have delighted theatergoers, because of their clean, wholesome, delightful fun, their sparkling wit, and tuneful melodies. The Savoy Theater, in London, was built especially for the Gilbert-Sullivan productions. *Pinafore* became almost a world-wide production. At one time, ninety companies were singing it in as many cities. Revivals of the operettas continue to charm American audiences.

The partnership continued until the death of Sullivan, in 1900. See SULLIVAN, SIR ARTHUR.

The most famous of the Gilbert-Sullivan creations are *Pinafore*, *The Mikado*, *The Pirates of Penzance*, *Patience*, and *Iolanthe*.

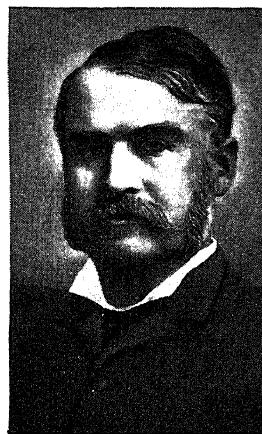
**GILBERT ISLANDS.** See PACIFIC ISLANDS.

**GILBERT PEAK.** See UNTA MOUNTAINS.

**GILBOA, BATTLE OF.** See DAVID (David and Jonathan).

**GIL'DER, RICHARD WATSON** (1844-1909), a poet, editor, orator, and lover of art, one of the most popular of Americans because of the purity of his patriotism and his tireless endeavor to serve his city and his fellow men. Born at Bordentown, N. J., in early life he planned to follow the legal profession, but the War of Secession made of him a soldier. At its close, he elected to enter the field of literature.

At the age of twelve, he published a little paper, which he not only wrote but set up and printed himself. He helped to establish the Newark (N. J.) *Morning Register*, and then in New York City became editor of *Hours at Home*. This periodical was merged into *Scribner's Monthly*, and he became its managing editor; and when the latter was changed to the *Century Magazine*, he became the editor-in-chief, which position he filled until his death.



W. S. GILBERT

On a par with Mr. Gilder's activities as an editor ranks his work as a poet, and some of his best efforts have been collected in *Five Books of Song*, *In Palestine*, and *Poems and Inscriptions*. Although a poet rather than a man of affairs, he always took an active interest in matters of public welfare, and became the head of several reform organizations. He was the first president of the New York Kindergarten Association, and one of his most significant services to his city was his devotion to the children of the tenements.

**GILDING**, the art of applying gold leaf or gold dust to metal, porcelain, wood, paper, or glass. The oldest and best method consists in applying gold leaf to a surface previously treated with sizing, which acts like a glue when partly dry and firmly holds the gold leaf. Before the gold leaf will adhere to cardboard or paper, two applications of sizing are required, as the first is usually absorbed. The frames of mirrors, pictures, and moldings are gilded with gold leaf, or a silver leaf to which a yellow varnish is afterward applied. The edges of books are gilded by coating with glue, preferably fish glue, applying the gold leaf, and afterward polishing (see BOOKS AND BOOKBINDING).

In gilding ivory, a warm sizing is used. In gilding glass, china, and pottery, gold dust is mixed to form a paint, and this is applied with a brush. The article is then baked in an oven at a low temperature, and later put in a kiln at a high temperature, to secure permanency. If such dishes are washed in soap a great deal and not very well rinsed, the alkali in the soap will gradually eat off the gold. In the gilding of iron and steel, gold leaf is sometimes applied after the surface has been well cleaned and heated until it turns a bluish color. In Saint Peter's Cathedral at Rome and the Congressional Library at Washington, D. C., gilding forms one of the chief interior ornamentalations; the dome of the State House in Boston is entirely covered with gold leaf.

[For a description of the process of chemical gilding, see ELECTROPLATING.]

**GILEAD**, the mountainous country east of the Jordan River, where the tribes of Gad, Reuben, and a part of the tribe of Manasseh settled when the Israelites took possession of the Promised Land. It was a splendid pasture, extending from the table-land of Moab north to the River Yarmuk, and it became the refuge for many who disagreed with the government during the history of Israel. It was the refuge for Absalom when he fled from his father. Here, too, the Christians found safety when Jerusalem was besieged. A famous balm (see BALM OF GILEAD), obtained in this country from nuts, was used as an ointment and was considered very precious.

[The expression, "Is there no balm in Gilead?" (*Jeremiah* viii, 22), often used to-day, means "Is there no place of refuge?"]

**GILEAD, BALM OF.** See BALM OF GILEAD.

**GILLETTE, jil et'**, WILLIAM HOOKER (1855- ), an American actor and dramatist. He is best known through his characterization of the title rôle in *Sherlock Holmes*, which he adapted from Sir Conan Doyle's stories of that hero. Gillette was born in Hartford, Conn., the son of a United States Senator. While acting in stock companies in New York and Boston, he studied at the University of New York and the Massachusetts Institute of Technology. He began his theatrical career in 1877, and soon commenced to write his own plays.

**Plays and Rôles.** In *Secret Service*, Gillette carried the War of Secession theme, which he began with *Held by the Enemy*, to the highest point such productions have reached. Others of his plays are *The Private Secretary*, *Emeralda*, and *Because She Loved Him So*. Plays of other dramatists in which he appeared include *Diplomacy*, *The Admirable Crichton*, *A Successful Calamity*, and *Dear Brutus*. In *The Astounding Crime on Torrington Road*, he showed his skill as writer of a mystery novel.

**GILL-OVER-THE-GROUND.** See Ivy (Ground Ivy).

**GILLOTT, JOSEPH**, inventor of a famous pen. See PEN.

**GILLS, gilz**, the breathing organs of fishes, located in chambers, one on each side of the body, just back of the head. They are also found in many other aquatic animals. If the throat of a fish be examined, a series of four or five slits, called gill-openings, may be seen. These open to the exterior; the fish opens its mouth at regular intervals, draws in a quantity of water, contracts the sides of its throat when it closes its mouth, and thus forces the water through the gill-opening, over the tiny gill-filaments to the exterior. When the water passes over the gill-filaments, the oxygen is extracted from it by the blood in the filaments and is carried to other parts of the body. In sharks these outer openings may be seen, but in bony fishes the chamber on each side of the head is covered by a bony plate. For illustration, see FISH.

Gills or modifications of these organs, located in different regions of the body, are found also in other classes of animals, includ-



Photo: Brown Bros.  
WILLIAM H. GILLETTE

ing mollusks, crustaceans, and some insect forms.

W.N.H.

**GILLYFLOWER**, another name for the wall-flower (which see).

**GIL'MAN, DANIEL COIT** (1831-1908), an American educator and the first president of Johns Hopkins University, was born at Norwich, Conn. He was graduated from Yale College in 1852, and continued his studies in Europe, in Cambridge University, and in Berlin. In 1872 he became president of the University of California, and in 1875 was elected first president of Johns Hopkins University at Baltimore, where he remained until 1901. The Carnegie Institution in Washington, D. C., also chose him as its first president in the latter year; he resigned this position in 1904. From 1893 till 1901, he served as president of the American Oriental Society, and The Russell Sage Foundation for Social Betterment appointed him a trustee in 1907. He was also vice-president of the Archaeological Institute of America. He published *Launching a University*, an account of the early years of Johns Hopkins, *Life of James D. Dana*, the geologist, and *Life of James Monroe*. Dr. Gilman was also one of the editors of the first edition of the *New International Encyclopedia*.

**GILMORE, PATRICK SARFIELD** (1829-1892), one of the most popular of American musical conductors, was born near Dublin, Ireland. At an early age he left his native land for the United States, and soon after his arrival, organized Gilmore's Band. In 1869 he arranged the National Peace Jubilee in celebration of the close of the War of Secession in America, and in 1872 the World's Peace Jubilee, after the close of the Franco-German War in Europe. On the latter occasion, he conducted an orchestra of 2,000 pieces and a chorus of 20,000 voices. Later, he organized the famous Twenty-second Regiment band in New York, which gave popular and successful concerts in the United States, Canada, and Europe. His successor, after his death, was Victor Herbert. Gilmore devoted little time to composing, his only work of note being an anthem entitled *Columbia*, intended as a national hymn. See BAND; HERBERT, VICTOR.

**GILSONITE.** See ASPHALT, subhead.

**GIMEL.** See G.

**GIN, jin**, a liquor distilled from grain. By far the larger part of the spirit was originally made in Holland, where it was sold under various names, according to slight variations in its composition. Gin can no longer be sold legally in the United States; the ordinary article sold in the lower class of drinking places in England consists of alcohol flavored with salt and oil of turpentine, and diluted to alcoholic strength of from twenty-five to forty-eight per cent. The basis of gin is alcohol and distilled water.

**Derivation of Name.** The word *gin* is derived from the Dutch *jenever*, the name in Holland for the juniper plant, the spirits of which, in minute quantity, are used to flavor the drink.

**GINGER**, a valuable and favorite seasoning and confection, with a warm, burning taste, obtained from the rootstocks of the ginger plant. Though native to the East Indies,

ginger has been introduced into Japan, the West Indies, South America, and West Africa. From the knotty rootstocks grow grasslike leaves and cylindrical stems bearing clusters of white, purple-streaked flowers. When the leaves wither, the roots are dug and dried whole to produce black ginger, or scraped, washed, and dried to

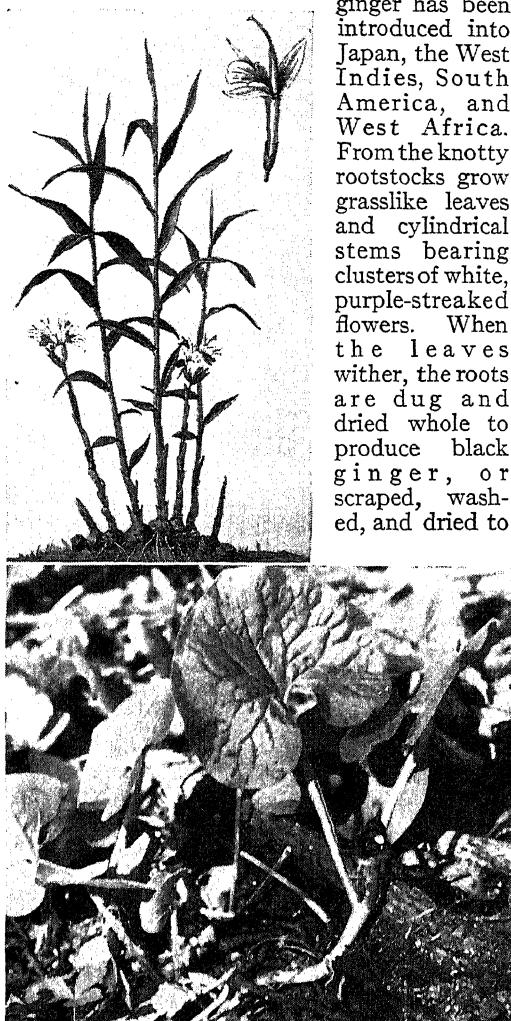


Photo: Visual Education Service

#### GINGER

The lower picture is that of wild ginger. Above, detail of the cultivated plant.

produce white ginger. If it is to be preserved, it is boiled and dipped in syrup every twenty-four hours for a week. The finest ginger is obtained from Porto Rico and Jamaica, and is generally sold in the form of an extract. Most of the preserved ginger is imported from China.

**Uses.** As a spice, ginger is well known to everyone from earliest childhood, through gin-

gerbread men and ginger snaps. And later we meet it in that home remedy for stomach-ache, ginger tea; or candied, or in the popular beverages, ginger ale and ginger beer. Ginger wine is cheap liquor flavored with ginger. The oil of ginger is used to lessen pain, but its commonest use is in seasoning a great variety of foods.

**Wild Ginger**, so called, a plant of the birthwort family, is found in the shady woodlands of the Northern United States. It is a low, woolly plant, with beautiful heart-shaped leaves, and one dull-colored, bell-shaped blossom growing close to the ground. The root has stimulating properties and is also used as a spice, but the plant is not related to true ginger.

B.M.D.

**Scientific Names.** The ginger of commerce is obtained from *Zingiber officinale*, family Zingiberaceae. Wild ginger belongs to the family Aristolochiaceae. Its is *Asarum canadense*.

**GINGERBREAD TREE.** See DOOM PALM.

**GINGHAM**, *ging' am*, originally a smooth, close cotton fabric, in plain colors, or woven of two colors of plain-dyed yarns into checkered, striped, or plaid patterns. A greater variety now appears in ginghams than formerly, and they are also woven of silk and cotton mixed, or of silk and ramie. Ginghams were first made in India, but now more than half a billion yards are manufactured yearly in the United States alone. Gingham differs from calico in that the colors are woven with the fabric, not printed on it, as is true of calico; gingham is thus alike on both sides.

**Derivation of Name.** The name is derived either from the Japanese word meaning *perishable*, or *fading*, or from the Malaysian word for *striped* or *checkered*.

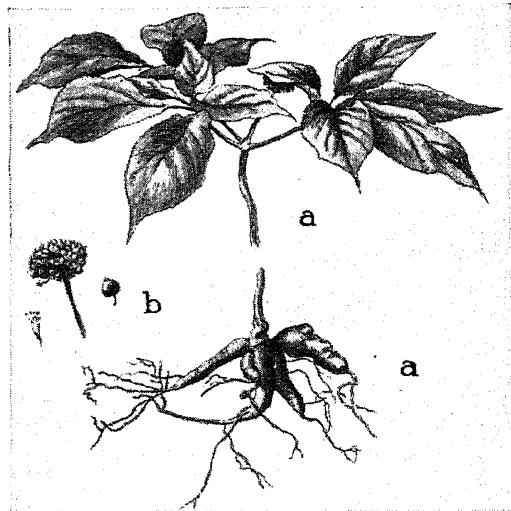
**GINKGO**, an interesting and attractive tree of the yew family, used as an ornamental street tree in the United States, to which it was brought from England. The ginkgo is of Chinese origin, but adapts itself readily to the soil and climate of other countries. A distinguishing feature is its foliage; the leaves look so much like fern fronds that the tree is often called "maidenhair tree." Young trees have an erect, compact form that makes them especially suitable as borders for narrow streets, but the branches tend to spread out as the trees become older. There are several avenues of ginkgo trees in Washington, D. C. The fruit is a fleshy drupe with an unpleasant odor, but the nut within is good to eat if roasted, and is prized by the Chinese and Japanese.

G.M.S.

**Scientific Name.** The scientific name of the yew family is *Taxaceae*. The ginkgo is *Ginkgo biloba*.

**GINSENG**, *jin' seng*, an herb with a fleshy, wrinkled, yellow taproot which the Chinese

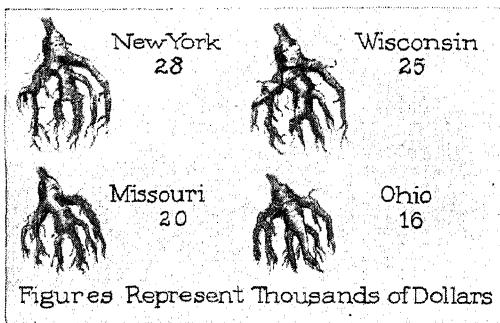
regard as a remedy for nearly every disease of body or mind. The name of this peculiar plant comes from Chinese words meaning *likeness of a man*, with reference to the oddly shaped root. Those most nearly like the human body are held in such superstitious reverence



GINSENG

(a, c) Top and roots of mature plant; (b) flower cluster and its parts.

by the Chinese that they are worth, literally, their weight in gold. The species of ginseng found in China and neighboring regions is difficult to cultivate and inferior in quality to the American ginseng, first made known to the Chinese trade early in the eighteenth century. Originally, it grew in wild profusion throughout the Allegheny highlands, was found westward to Minnesota, and flourished in Ontario and Quebec, but the demand for the



PRODUCTION OF GINSENG

The average annual value of the crop in the four states which lead in its cultivation.

prized roots and the high prices obtained for them practically exhausted the natural supply. Accordingly, ginseng culture for the Oriental trade was taken up, and has brought good

profits to the few who have mastered the difficulties of raising this somewhat exacting plant. Ginseng is a low herb with a three-branched stem, each branch bearing five leaflets. The small greenish-yellow flowers eventually change to scarlet berries.

**Its Cultivation.** Ginseng will thrive in a soil which is rather loose, well drained, and rich in humus, potash, and phosphoric acid, but not in nitrogen. Since exposure to the full heat of the sun will kill it, ginseng-growers who cultivate the plant in the open protect their crop by erecting a lattice-work covering. Posts six feet high are placed along the beds at intervals of sixteen feet, and to these are fastened, both at the sides and across the tops, two-inch boards, two inches apart. The effect of the sun is therefore diminished about fifty per cent. Ginseng is planted in beds, six inches apart each way, and it takes six years to reach maturity. Thus, to make sure of having a continuous crop, the grower must plant a new supply each year. Each root weighs about two ounces after drying.

B.M.D.

**Scientific Name.** The American species is *Panax quinquefolium*; the Chinese, *P. ginseng*. The species belong to the family *Araliaceae*.

**GIOCONDA, LA, OR MONA LISA.** See illustration, article PAINTING.

**GIORDANO, jawr dah' no, LUCA** (1632-1705), an Italian painter and son of an artist, born at Naples. As a boy he was nicknamed LUCA FA-PRESTO (Luke Work-fast), because his father used the phrase continually to spur him on. He studied under the Spanish historical painter, Ribera, and while still a youth went to Rome, where he received additional instruction under Cortona, and acquired facility with his brush by incessantly copying the great masters. His historical paintings and frescoes won him wide renown, and in late middle life he went to Madrid on the invitation of Charles II, to become painter to the king. Among the works executed during his service there, which continued under Philip V, are his decorations of the grand staircase of the Escorial.

**Estimate of His Work.** Giordano's canvases may be seen in numerous European galleries, for his output was astonishing. His paintings are attractive because of good color work, but they were carelessly executed, and their creator does not rise to real greatness in them. Representative of the best of these are *Cleansing of the Temple*, Naples; *Venus and Mars*, Louvre; *Judgment of Paris*, Berlin; and *Christ with the Doctors in the Temple*, Rome.

**GIORGIONE, jawr jo' nay** (1477-1510), one of the most renowned of Italian painters, the first Venetian to handle brush and colors freely, without the restraint imposed by religious feelings of an earlier period. It was he who modified the older method of the

Venetian school and prepared the way for its final form as represented in the works of the greatest Venetian master, Titian (which see). His real name was GIORGIO BARBARELLI, but by his contemporaries he was called Giorgione, meaning *George the Great*, because of his tall figure, his intense love for beauty, and his greatness of mind. He was much employed in decorative painting, having ornamented the façades of several large buildings in Venice with frescoes, but because of climatic conditions and effects of time, these have now mostly perished. His pictures are rare, and there is a diversity of opinion among the best judges concerning the genuineness of many assigned to him.

**Representative Works.** Among the paintings ascribed to Giorgione with reasonable accuracy are *Christ Bearing the Cross*, Gardner collection, Boston; *Three Ages of Men*, Pitti Palace; *Sleeping Venus*, Dresden Gallery; *Knight of Malta*, Uffizi Palace; and *Gypsy and Soldier*, Venice.

**GIOTTO, OR GIOTTO DI BONDONE,** *jaw' toh de bohn doh' nay* (1276-1337), a painter, sculptor, and architect who occupies a prominent place in the history of Italian painting, because he helped to lay the foundations for the greater achievements of the Renaissance painters who followed him. He was a leader in the awakening of a new life in Italian art; where painting had been lifeless and conventional, he made it natural in form and spirit. Much legendary matter has been woven about the life of Giotto, and even the date of his birth is disputed. He was born in a village near Florence, and was a prominent figure in the Florentine life of his day. Dante, Petrarch, and Boccaccio all make mention of him.

**Summary of His Work.** As an architect, Giotto is remembered chiefly for the famous Campanile, or bell tower, of the cathedral at Florence, commonly called Giotto's Tower (see CAMPANILE). Exquisite in design and rich in decoration, it was unfinished at the time of his death, but Giotto left a perfect model, and it was com-

pleted by his pupils. His principal paintings were frescoes, with which he adorned churches and chapels in all the large cities of Italy. Some of his frescoes have been destroyed or defaced, but enough of his work remains to show the fine spirit and power of his genius. Among his best frescoes are those in the Arena Chapel in Padua. Twenty of his smaller paintings are to be found in the Florence Academy, two in Berlin, and four in private collections; these originally formed a series of twenty-six illustrative of the lives of Christ and Saint Francis. A mosaic of the *Navicella*, or Christ saving Saint Peter from the waves, is now preserved in the portico of Saint Peter's Church at Rome.

**GIOVANNI DA FIESOLE, je o vah' nie dah fyeh' zo lay, FRA.** See ANGELICO, FRA.

**GIPSY.** See GYPSY.

**GIRAFFE, ji raf'**, OR CAMELOPARD, *ka mel' o pahrd*, the tallest of all animals. A full-grown male giraffe is eighteen feet high, three times the height of a tall man. Giraffes are found only in Africa, and in numbers only on the arid plains of the interior. With the okapi (which see), they form a distinct family among ruminating, or cud-chewing, mammals (see RUMINANTS).

The great height of the giraffe is due to an extraordinary length of neck, in which, however, there are but seven vertebrae. The body is short and slopes sharply down to the tail, which ends in a tuft of hair, and to the casual observer it seems that the front legs are longer than the hind ones; however, the long, slender legs, clovenhoofed, are all the same length. On the long head are two ears of moderate size and two short, bony projections resembling horns, covered with hairy skin. The upper lip, which extends far beyond the nostrils, and the eighteen-inch tongue lend help in tearing twigs and leaves from trees. The nostrils can be closed to guard against thorns when the animal is feeding, and against blowing sand. The eyes are large, lustrous, and appealing, and so



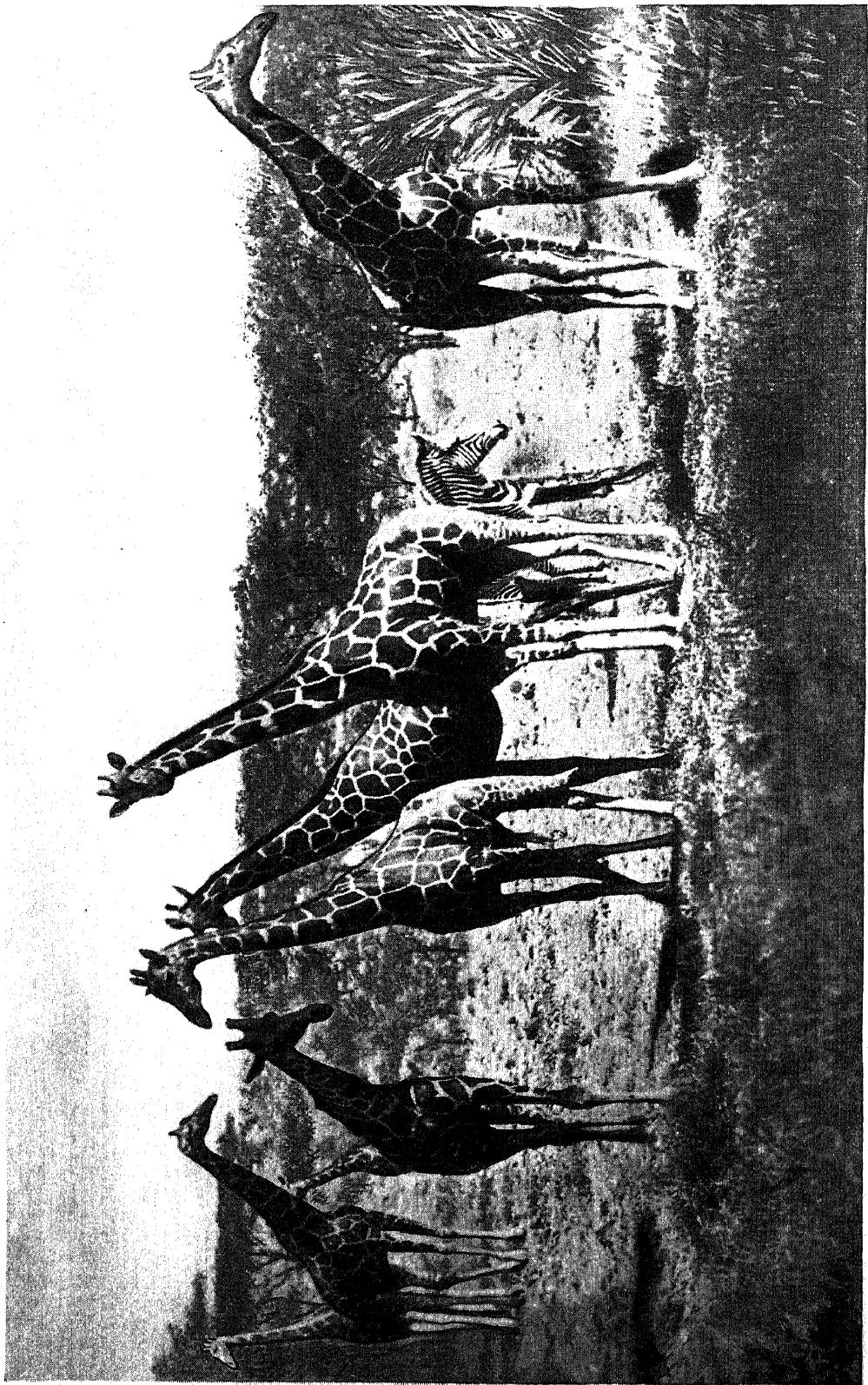
SPECIMEN OF Giotto's ART  
A madonna, now in Florence

placed that the giraffe can see behind him, in front, and at the sides.

Photo: Wide World

Among the Strangest of Earth's Creatures. A group of giraffes photographed by Mr. and Mrs. Martin Johnson in the heart of Africa. A zebra is seen in the group.

2812



Excepting a short mane on the neck, a giraffe's hair is short and smooth. It is reddish-white, marked with darker spots. When grazing, the animal stands with its front legs far apart, to bring its head nearer to the ground. A singular fact about the giraffe is that it has no voice. It cannot utter the slightest sound, even under extreme conditions of danger or injury.

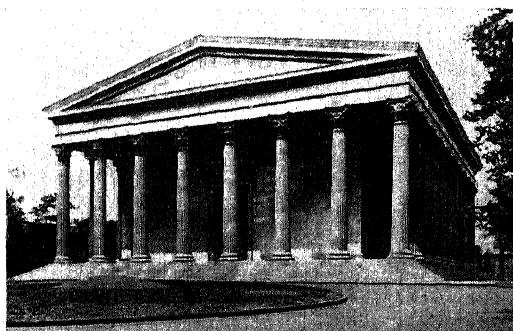
This animal, keen of smell, hearing, and sight, walks very slowly, but when pursued, runs fleetly in a rocking, camel-like gallop, and is not easily overtaken even by a horse. But when once reached, it is easily killed, and giraffes have been hunted so vigorously for their hides, which are made into whips in use all over South Africa, that they are gradually being exterminated.

The giraffe requires very careful attention and constant care in captivity, or it will die. It is one of the animals arousing most interest in parks and zoölogical gardens, not only for its remarkable appearance, but for its amusing, hopping antics when playing. W.N.H.

[The name *camelopard* is given because the animal is formed somewhat like a camel and is spotted like a leopard. The name *giraffe* means *to walk slowly*.]

**Scientific Names.** Giraffes belong to the family *Giraffidae*. The typical species is *Giraffa camelopardalis*. In addition to several subspecies, there is one other recognized species, the Somali giraffe, *G. reticulata*.

**GIRARD COLLEGE**, a school founded in Philadelphia in 1848 by the will of Stephen Girard. The purpose was to provide for the education of "poor white male orphans" from the ages of nine to nineteen. The institution was first placed in the trust of the city council of Philadelphia, but that plan was found impracticable, and it is now managed by the board of directors of city trusts, which includes



GIRARD COLLEGE

The original building, erected in 1848.

the mayor. By one of the peculiar terms of the will, "no ecclesiastic, missionary, or minister of any sect whatsoever" can be employed in any capacity in the school. This

provision was not made on account of hostility to religion, but "to keep the tender minds of orphans free from the excitements which clashing doctrines and sectarian controversy are so apt to produce."

There was considerable public criticism of this provision, and in a suit by the heirs to set aside the will, Daniel Webster, for the plaintiffs, made a strong plea for Christian teaching. But the will was upheld, and the college was established according to the terms of its founder.

The main building, completed in 1848, and designed by Thomas Ustick Walter, has been called the most perfect Greek temple in existence. Artists and architects from all countries visit and study this building for its beauty of design and the perfection of its proportions.

All branches of work up through high school and along mechanical lines are taught, to fit boys for earning their own living. By wise investment, the endowment of the school has increased to more than \$30,000,000.

**Stephen Girard** (1750-1831), the American financier and philanthropist who founded Girard College, was the chief financial adviser of the United States government in the War of 1812. He was born at Bordeaux, France, the son of a sea captain,

and at the age of twenty-three became a captain himself. In 1776 he settled in Philadelphia. After the Revolutionary War, Girard became much interested in the first United States Bank, buying most of its stock and buildings in 1812. This he made one of the soundest and most successful institutions in the United States, and in 1814 he took up almost an entire loan of \$5,000,000 for the government. Later, he became one of the principal stockholders and directors in the second United States Bank. He left his immense fortune to charitable and municipal institutions in Philadelphia and New Orleans. See **BANK OF THE UNITED STATES**.

**GIRASOL.** See **OPAL**.

**GIRDER.** See **CARPENTRY**.

**GIRDLE OF VENUS**, a very remarkable member of the jellyfishes, found only in the Mediterranean Sea. It is from four to six feet in length, and is only about two inches in width. The mouth is strangely placed near the center of its lower edge, and the long edges are bordered by small swimming plates. By night it exhibits phosphorescent colors; by day it is iridescent. It is delicate in structure, and therefore difficult to catch undamaged.

**GIRL OF THE GOLDEN WEST.** See **OPERA** (Some of the Famous Operas).

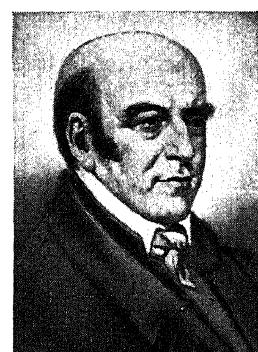


Photo: Brown Bros.

STEPHEN GIRARD



## G *The Story of GIRL SCOUTS*

**GIRL SCOUTS**, an organization which aims "to bring to all girls the opportunity for group experience, outdoor life, and to learn through work, but more by play, to serve their community." It is open to all girls who wish to join and who voluntarily accept the promise and laws. Its purpose is similar to that of the Boy Scouts, and its headquarters for the United States are in New York City.

When Sir Robert Baden-Powell, founder of the Boy Scouts in England, realized the eagerness of girls for a similar union, he helped to work out the principles of the "Girl Guides." This movement has since spread into more than thirty countries and includes over 600,000 members. Through the encouragement of Baden-Powell, Mrs. Juliette Law, of Savannah, Ga. (died 1927), organized the first "Girl Guides" in the United States in 1912. The movement grew rapidly, the name was changed to "Girl Scouts," and the group now numbers well over 170,000 active members in the United States and its possessions. Through an International Council, the national groups are affiliated, and although they maintain separate organizations, they have the same laws and purposes.

The movement was first intended for girls from ten to eighteen years of age. Later, provision was made for the admission of smaller girls, who are called Brownies, or Junior Scouts, and whose activities include games, self-help, and aid to their families. Scouts over eighteen are known as Citizen Scouts, and are expected

to be self-directing and to take active part in the life of the community.

The official costume of the Girl Scouts was changed in 1927 from the former uniform of khaki to one of gray-green cotton twill, with flat collar, worn with a top coat and hat of Lincoln green.

The purposes of the Girl Scout movement are shared by other agencies, but the distinctive feature is the group organization, or teamwork method, by which these purposes are achieved. A natural unit of eight girls forms a Patrol, which selects one of its own members as leader. One or more patrols constitute a troop, the organization unit, which is presided over by a captain, with her lieutenants. The

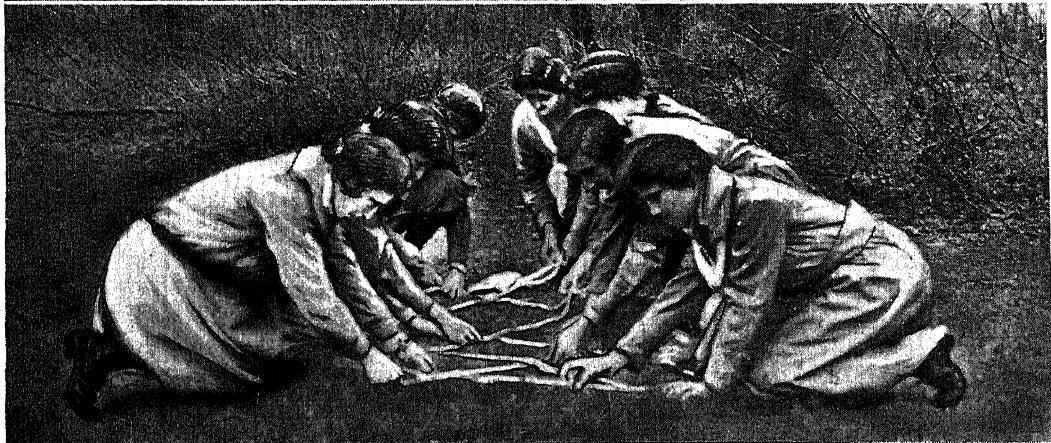
captain must be a young woman at least twenty-one years of age, trained by national headquarters. Leadership in the movement is largely voluntary. A girl who is isolated and cannot join a Patrol may become a Lone Scout, working out her individual achievements with all possible help from the national organization.

**Steps to Advancement.** Girl Scouts are divided into three classes. The *Tenderfoot Scout* must learn the laws, promise, slogan, and motto of the Scouts, and must give evidence of a few

simple accomplishments, including the earning of part of the money for her Scout outfit. The *Second-class Scout* must pass various tests relating to home and handicraft work, health, and service to the community. The highest rank, *First-class Scout*, is won only after con-



AT SALUTE



Girl Scouts at Work. (1-2) Putting up tents at camp. (3) Making a stretcher, one of the activities of national training week.



**At Work and Play.** (1) Girl Scouts preparing lunch. (2) Instruction in fire-making. (3) Practice in archery

siderable evidence of accomplishment in the same three fields of endeavor. Awards and merit badges are given for achievements in the three classes, and a First-class Scout may continue to work for awards in a possible range of fifty subjects. The special award for greatest merit and evidence of the Girl Scout spirit, given only in exceptional cases, is called the Golden Eagle.

**Motto and Principles.** The motto of the Girl Scouts is, "Be Prepared"; the slogan, "Do a Good Turn Daily." Each member promises, on her honor, that she will try to do her duty to God and her country; to help other people at all times; to obey the Scout Laws. There are ten cardinal principles embraced in the Scout Law, as follows:

1. A Girl Scout's Honor is to be trusted.
2. A Girl Scout is Loyal.
3. A Girl Scout's Duty is to be useful and to help others.
4. A Girl Scout is a friend to all, and a sister to every other Girl Scout.
5. A Girl Scout is Courteous.
6. A Girl Scout is a friend to Animals.
7. A Girl Scout obeys Orders.
8. A Girl Scout is Cheerful.
9. A Girl Scout is Thrifty.
10. A Girl Scout is Clean in Thought, Word, and Deed.

Initiative, self-control, self-reliance, service to others, and the other qualities which will be most worth while to the Scout when she grows to womanhood, are developed by a program which centers around outdoor living, home-making, and community service. In their hikes and camping, Girl Scouts learn simple human needs and how to meet them, to enjoy natural recreation instead of artificial amusement, the worth and pleasure of work, and the nature lore which is so fundamental a need in everyone. In their home-making activities, they find fun and interest in household tasks often considered dull and tiresome. The Patrol system, with its self-government and its group activities, fits its members for taking part in government and gives them a wholesome interest in community and national welfare. Group competition and group coöperation and loyalty in dozens of activities transform the difficult job of learning to live usefully and happily into a fascinating game. J.D.R.

**Related Subjects.** The reader is referred in these volumes to the article CAMP FIRE GIRLS, and to that on a similar organization for boys, the BOY SCOUTS.

**GIORDONISTS**, *jih ron' dists*, a political party in the Legislative Assembly and National Convention during the French Revolution (1791-1793). The name was applied because of the fact that the most brilliant exponents of its point of view were deputies from the district near Bordeaux called the Gironde.

Madame Roland, whose salôn became their gathering place, exercised a powerful influence

on the spirit and policy of the Girondists, but such party cohesion as they possessed was due to the energy of Brissot, who was regarded as their spokesman in the Assembly and the Jacobin Club. They were distinguished for visionary ideals, rather than for a well-defined policy. They became an easy prey for the more radical Jacobins, and their overthrow was accomplished in June, 1793. See ROLAND DE LA PLATIÈRE, MADAME; JACOBINS; FRENCH REVOLUTION.

**GIRTY, SIMON** (1741-1818), a picturesque and questionable character in the American Revolution. His family was captured by the Indians, and he witnessed the burning of his stepfather at the stake. He became a Loyalist during the struggle for American Independence, and did much to keep the Indians stirred up against the colonists. In 1777 he attacked Fort Henry with a band of 400 Indians, but was repulsed. He invaded Kentucky with his Indians, in 1782, and was present at the attack on Bryant's Station and Blue Licks. He is said to have given an order to scalp General Butler, who had been wounded. Again, in 1812-1814, he aided the British against the Americans. The story of his life is told by Butterfield in his *History of the Girty's*.

**GISH, LILLIAN.** See MOVING PICTURES (list of players).

**GIST, CHRISTOPHER.** See WASHINGTON, GEORGE (Life on the Frontier).

**GIULIANI, MAURO.** See GUITAR.

**GIZEH.** See PYRAMIDS.

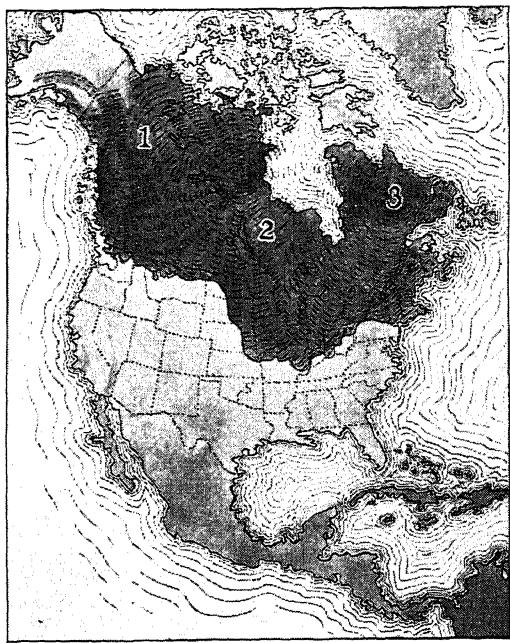
**GIZZARD**, a portion of the digestive apparatus found in certain animals, especially in birds, where hard, solid food is ground to fineness. The gizzard of birds is a muscular portion of the stomach, lined with a thick, tough membrane. Food first enters a pouch called the *crop*, where it is moistened in a fluid secreted there. Passing next to the stomach, it is mixed with gastric juice. It then goes into the gizzard, where it is crushed by the muscular action of the thick walls; gravel swallowed by the bird assists in the grinding process. Birds that eat grain have more powerful gizzards than those which eat insects, but in birds of prey, the gizzard is only slightly developed. Among other animals possessing a similar grinding apparatus are the earthworm, the crayfish and its allies, and certain insects. See POULTRY, for picture. W.N.H.

**GLACE BAY.** See CAPE BRETON ISLAND.

**GLACIAL, *gla' shal*, DRIFT.** See DRIFT.

**GLACIAL EPOCH**, technically called *Pleistocene Epoch*. Boys and girls who live in Canada, or almost anywhere in the Northern United States, can hardly believe that once, even though it was thousands of years ago, their home land was covered by a vast sheet of ice. As they look about them on fields and streams and forests aglow with beauty,

their minds can scarcely picture so cold and forbidding a scene where now millions of happy people live. When it is realized that, in some places, the ice sheet was probably a mile or more thick, the fact seems more astounding.



GLACIAL NORTH AMERICA

The dark area represents the ancient field of ice.  
(1) Cordilleran ice sheet; (2) Keewatin sheet; (3) Labrador sheet.

The period in which this geological event occurred is commonly known as the Glacial Epoch, though the name is not altogether appropriate, for it was not the only epoch in which there was continental glaciation in the temperate zones. Moreover, although the ice sheets occupied more than 8,000,000 square miles of the earth's surface, they covered but a small part of the land area of the globe. Nevertheless, the development of the great ice sheets was a striking feature of the epoch. This epoch was the first division of the Quaternary Period, succeeding the Pliocene and succeeded by the Recent Epoch. *Pleistocene*, the technical name, is from the Greek phrase meaning *most recent*.

**Extent of the Ice Sheets.** With the exception of most of Alaska, the area invaded by the ice included all the northern part of the continent, extending approximately as far south as New York Bay and the Ohio, Missouri, and Columbia rivers. There was also extensive glaciation in the Rocky Mountains and in the Sierra Nevadas, much farther south than any glaciers now existing. In Europe the Scandinavian Peninsula, Denmark, much of

Russia, the greater part of the British Isles, and the lowlands of Belgium, the Netherlands, and Germany were invaded by ice sheets. The glaciers of the Alps and the Caucasus covered a much greater area than at present, and there was local glaciation in the Pyrenees and elsewhere. Parts of Asia, South America, and Australasia were also ice-covered.

**Effects of the Ice Movements.** On each continent, the ice accumulated about several centers of dispersion. As it reached a great thickness, it moved outward from the center in all directions, but mainly southward. Fed and impelled by the ever-increasing thickness of ice and snow, the great ice sheets spread over the surface, crossing ranges of hills and low mountains, deep valleys, and even shallow seas like the Baltic. At their greatest extent they covered hundreds of thousands of square miles and were several thousand feet thick, so that mountains such as the Adirondacks were completely buried in ice. As the ice advanced, it removed the soil and loose material down to the bedrock, into which it gouged deeply in places. Hilltops were ground down and valleys were deepened, and altogether a great amount of rock material was removed and transported by the ice, some of it for hundreds of miles.

Eventually, the ice sheets spread so far that their advance slackened and ceased, and their southern margins could not extend beyond where the ice melted as fast as it advanced. The transported material was deposited at the margin of the ice in an irregular, hummocky ridge called the *terminal moraine*, or was borne away, perhaps for many miles, by water flowing from the melting ice. When the advance of the glaciers had ceased, they began to melt away from the area they had occupied, leaving behind them great drift sheets formed of the transported material. In areas of little relief, such as the prairies of the North Central states, the thick blanket of drift obliterated the former topography and gave a new surface to the region. On this surface was developed a new system of drainage, which in many districts is characterized by the abundance of lakes and swamps. During the disappearance of the ice, many temporary lakes were formed in low places along the ice margin. When these lakes were drained, through the opening of lower outlets by the further melting of the ice, the silt deposited on their former beds became the fertile soil characteristic of such prairie areas as the Valley of the Red River in Minnesota and North Dakota (see AGASSIZ, LAKE.)

**Not One But Many Ice Ages.** There is abundant evidence that the glaciation, at least in the northern hemisphere, was not a single episode but comprised four and possibly five glacial stages, separated by intervals during which the ice disappeared from most of the area that it had covered, and the climate was

much like that at present. During such inter-glacial stages, the surface from which the ice had melted was again subjected to weathering and erosion, new soil was formed, and the land was reoccupied by plants and animals. If in the next glacial stage, that area was again invaded by ice, the topography and soil just developed, together with remains of animals and plants, were buried beneath later glacial deposits.

A great deal has been learned from these buried soils and the fossils that they contain regarding the life and climate of inter-glacial times. The land in the polar regions is now largely covered by ice, and many geologists suspect that the Human, or Recent, Epoch, which includes the present time, is in reality only an inter-glacial stage, and that in a few tens of thousands of years, another glacial stage may begin.

**Life of the Epoch.** Most living species of plants originated before the Pleistocene Epoch; hence the plant life during the epoch was nearly the same as at present. The same statement is true, in general, for invertebrate animals and for most vertebrates except birds and mammals. Several species of mammals that thrived in early Pleistocene time became extinct before the end of the epoch. Parts of North America were inhabited by the mastodon, the mammoth, and other elephants, the glyptodon, the woolly rhinoceros, and the saber-toothed tiger, all now extinct, and by horses, camels, antelopes, and other animals not now native to the continent. Similar large mammals, of species now extinct, inhabited parts of Europe, and in South America there were gigantic sloths. In the regions directly or indirectly affected by glaciation, the plants and animals shifted their habitat with the changes in climate, but in other parts of the world there was little change in the forms of life during the Pleistocene, other than the extinction of some species of mammals and a notable restriction of the range of others.

In Europe there is definite evidence of the existence of early man during a part of Pleistocene time, and contemporaneously with some of the large mammals of now extinct species. The existence of Pleistocene man in North America is still a moot question. Some geologists maintain that evidence of his existence in late Pleistocene time has been found in several localities, but some anthropologists insist that it is highly improbable that man reached the continent until after the close of the epoch.

**Continental Changes.** The Pleistocene Epoch was marked, like most earlier epochs, by vertical movements of the continental margins which did not greatly affect the outlines of the continents as a whole. The world-wide eleva-

tion and joining of several continents into one huge land-mass, that characterized the Pliocene Epoch, continued into the Pleistocene, but was succeeded by a general subsidence to such an extent that the continents were for a time smaller than now. Later elevation resulted in conditions approximating those at present. The general movements were complicated by local movements of several sorts, and in some



GLACIAL AREAS OF EUROPE

regions, especially in the East Indies and the West Indies, there was folding and faulting on a mountain-building scale.

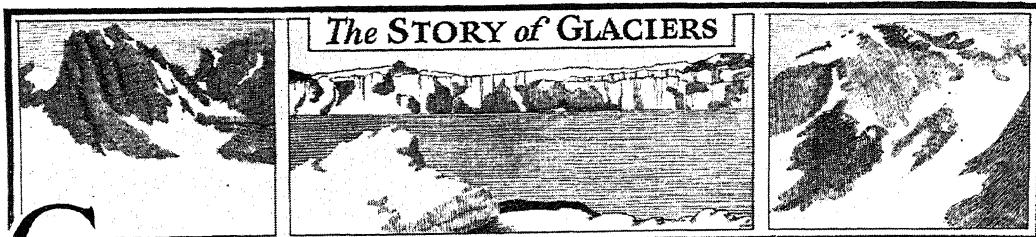
**Causes of the Glaciation.** Many theories of the cause of the Pleistocene glaciation have been propounded, but so far, none has been generally acceptable and the cause remains a mystery. Any satisfactory theory must take into account the fact that continental glaciation was not confined to the Pleistocene Epoch, but occurred several times previously, even as long ago as the Proterozoic Era. Not improbably, several causes combined to bring on each of the glacial epochs, and the chief cause may not have been the same each time. The world-wide elevation of the land and the joining of the continents in the Pliocene Epoch may have been an important factor in starting the Pleistocene glaciation. Such a marked geographic change could not have failed to bring about a marked climatic change, partly through altering the oceanic circulation. Similar geographic changes seem to have preceded the Permian glaciation, which may have been more extensive than that in the Pleistocene. Again, if, as some suspect, Pleistocene conditions still persist and the present time is an inter-glacial stage that may be followed by more glaciation, the climate of the world at present can hardly be typical of most of past geologic time, and the causes of the Pleistocene glaciation, whatever they were, may still be in operation, at least to some degree.

L.L.A.F.

**Related Subjects.** The reader is referred in these volumes to the following articles:

Geology  
Glacier

Moraine  
Human Epoch



**G**LACIER, *gla' shur*. Imagine a great river stretching from near the summit of a lofty mountain down its sides for thousands of feet—a river, not of hurrying, sparkling, limpid water, but of solid ice, with a movement so slow that its pace is measured in inches per day, rather than in miles per hour.

Some of the snow which falls high up on the mountains is lost by evaporation; in certain altitudes some is melted, and in the form of streams begins to run through ruts and gullies down the mountain sides, to form rivers. However, much of the snow that accumulates at the high altitudes becomes snowy ice, and begins, by its great weight, to move in a mass very slowly down toward the valleys. This slow movement, usually only a few inches a day, continues until a point in its descent is reached when evaporation and melting offset the supply from higher regions. At this point the glacier proper ends and rivers begin, if the location is inland. If the end of the glacier is at the sea, great masses of glacial ice may break off and drop into the sea and become icebergs. Such, in brief, is the word picture which may be drawn of this majestic, awe-inspiring spectacle of mountain glaciers.

Glaciers are always formed wherever more snow falls than melts during the year; consequently, they are found in cold climates like those of the polar regions and on the summits and slopes of high mountains in the temperate and tropical latitudes. The best-known glaciers are those of the Alps in Europe and those of the western mountains in the United States, Canada, and Alaska. They are also found in the Scandinavian Peninsula, in the Andes, and the Himalaya Mountains; on Greenland and other islands in the Arctic Ocean, and on the Southern Alps in New Zealand.

In North America, the largest glaciers are found on the shores of Glacier Bay and around Mount Fairweather in Alaska. There are also extensive glaciers around Cook's Inlet. Compared with these Alaskan glaciers, those of the Alps are mere rivulets. The Malaspina, on Yakutat Bay, Alaska, is 1,550 feet high and has an area of 1,500 square miles; the Valdez, on Prince William's Sound, is fifteen miles long; the Muir, named for John Muir, at the

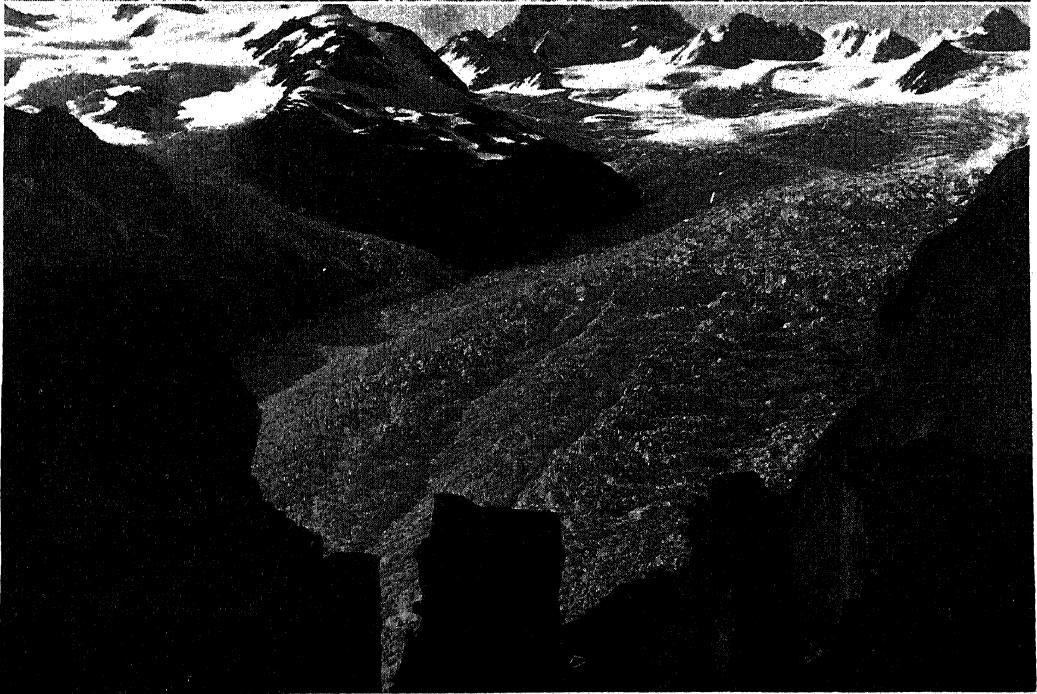
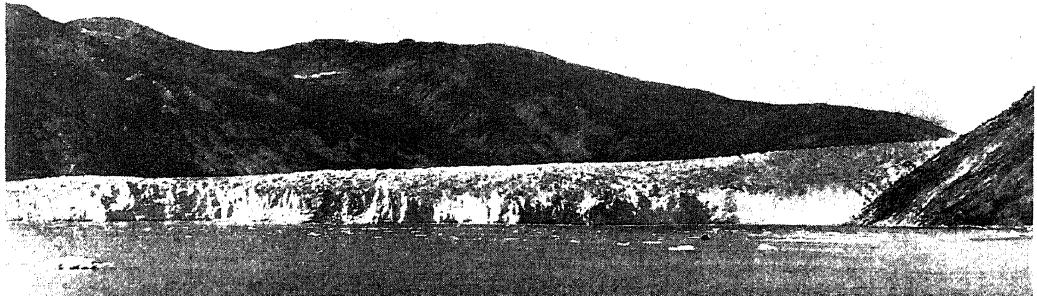
head of Glacier Bay, is 200 feet high and has a frontage of three miles on the coast. Many of the valleys of the Alaskan coast are filled with ice rivers, and the fjords of this region were formed by the action of glaciers.

In Glacier National Park, Mont., and in Rocky Mountains Park, just to the north, in Canada, are numerous glaciers which can be easily reached and are interesting to study. Large glaciers are also found in the Selkirk Mountains in British Columbia, along the line of the Canadian Pacific Railway. These glaciers are visited by thousands of tourists every season. Among the most noted glaciers of Europe are the Mer de Glace on Mont Blanc, and those on Mont Rosa.

**Structure.** Glaciers are formed by the freezing and pressing together of masses of snow. After snow has lain upon the ground for some time, the flakes lose their form and the snow becomes granulated, as we see it in snow-drifts in the spring. On the mountains where snow remains from year to year, this granulated snow becomes frozen into a porous ice which the French call *neve*, the name generally given it by geologists, but which we call glacial ice. A layer of glacial ice is formed each year, and the lower layers become more compact than the upper, so these lower layers more closely resemble ordinary ice.

**Crevasses.** The irregular surface over which the glacier moves often causes the ice to crack and form crevasses, which are sometimes more than 100 feet deep. Since these are often filled with light snow, they are very dangerous to travelers. The sun melts the ice at the top of the crevasse faster than it does that below; hence the crevasse becomes wedge-shaped and continues to increase in size. Sometimes the crevasses are closed by the movement of the glacier.

**Surface.** The surface of the glacier becomes very irregular. This condition is due to the crevasses, to stones and other materials which the glacier gathers as it moves down the mountain, and to irregularities caused by the unequal melting of the ice. The porous ice melts much faster than that which is more compact, and in time the surface is covered with hollows and slight elevations. Stones shield the ice from the rays of the sun; so wherever they are lodged, there are irregular surfaces.



Photos: New Zealand Railway System; O R O C

Rivers of Ice. At top, Tabu Glacier in New Zealand. Center, Mer de Glace, nine miles long, formed by three glaciers rising in Mont Blanc. Below, Franz Josef Glacier, nine miles long and three miles wide, in the Southern Alps, New Zealand.

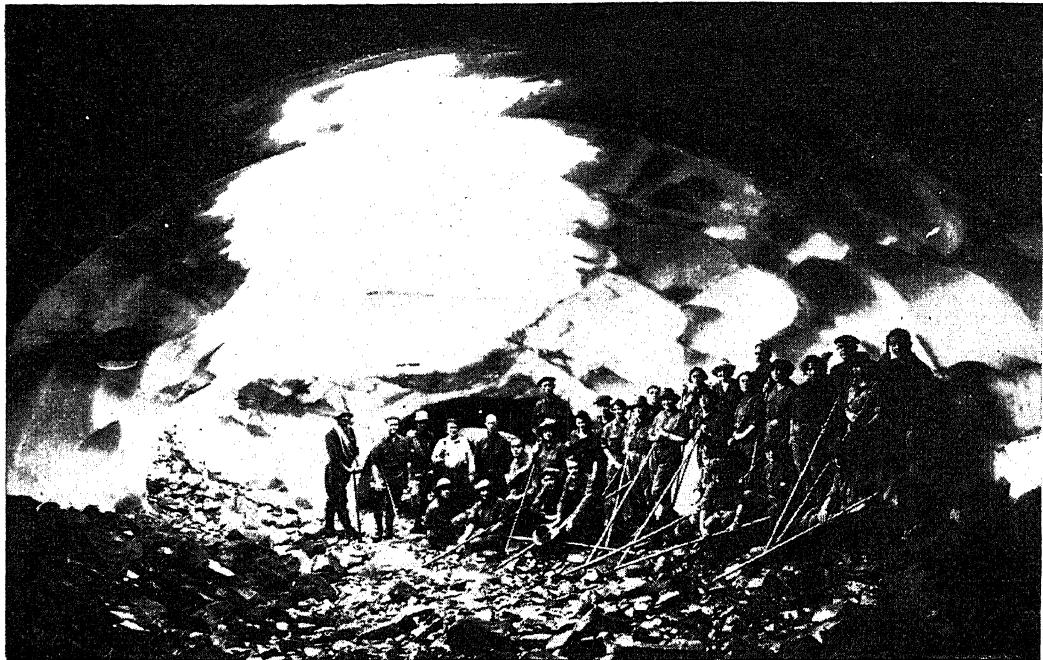


Photo: Keystone

## A PLEASANT SPOT ON A HOT DAY

A natural cavern under a glacier in Rainier National Park, Washington.

**Terminal.** The lower end of the glacier is sometimes very steep, and from under it there issues a stream of ice-cold water, formed by the melting of the glacial ice.

**Movement.** A glacier moves down a valley very much as a mass of tar almost solid would move down an incline. The upper and middle parts of the stream travel the fastest, the sides and bottom being held back by friction on the sides and bottom of the valley. The rate of motion can be measured by measuring the movement of any object on the surface. It may be as rapid as eighteen to twenty-four inches a day. The lower end of the glacier may retreat up the valley in summer and move down again in winter; or it may remain stationary. This depends upon the rapidity with which the ice is melted. When the end of a glacier juts so far into the sea that it breaks off from the main body, the mighty fragments form icebergs, which float down from the frozen north toward civilization, to become a menace to navigation. The story of an iceberg is told under that title.

**Moraines.** On its way the glacier gathers rocks and other material, which usually form lines that may be tracked through the mass; those near the sides are known as *lateral*, and those toward the middle are *medial*, moraines. The debris deposited at the end of the glacier forms the *terminal* moraine.

**Erosion.** As a glacier plows its way down the valley, it carries along with it all the loose

material on its bed. Thus it deepens the valley, lays bare the rocks and polishes them, and marks them with *striae* (scratches). The work of erosion now performed by glaciers, however, is inconsiderable.

**Famous Glaciers.** The most notable of the world's glaciers are the following:

**Malaspina,** *mah lah spe' nah*, the largest in Alaska, is equal in area to one-tenth of Switzerland, a land of many glaciers. It is more like a lake of ice than a river; it does not flow down a valley, but lies in a great table-land, and is formed by the inpouring of several valley glaciers. On the western coast of the territory, it overlooks the Pacific for scores of miles, and as its great mass moves slowly but constantly under the pressure of the ice behind it, huge masses break off into icebergs, which render sea travel dangerous in near-by waters.

Every characteristic feature that other famous glaciers have, the Malaspina possesses. There are crevasses that reach far downward; there are rushing streams in summer, and lakes dammed up by heaps of débris; and there are moraines. Indeed, the moraines along its border constitute one of its outstanding features; below, reaching to a depth of a thousand feet or more, there is ice which never melts; above, on the solid matter deposited through the ages, are spreading trees, and, in the summer, blossoming flowers.

**Mer de Glace,** *glahs*, a celebrated Alpine glacier which has a greater velocity than any other in the Alps Mountains. Its rate of movement averages eighteen or twenty inches a day. This sea of ice is situated on the northern slope of Mont Blanc; it has an area of sixteen square miles and a length of about



Photos: O. R. O.



nine miles. It is noted for beautiful surrounding scenery, and is easily reached by tourists from the village of Chamouni. Most sightseers especially wish to view the solitary rock, or oasis, called *Le Jardin*, seven acres in extent and covered with beautiful foliage, which lies in the upper part of the glacier. The lower end, where it flows into the Arveyron River, in the Valley of Chamouni, is known as the Glacier des Blois.

Muir, a celebrated glacier of Alaska, discovered by John Muir, for whom it was named. It is at the head of Glacier Bay, rises over 200 feet above the water, extends inland fifteen miles, and covers an area of 350 square miles. The extent below the surface of the sea is estimated at 700 feet. Muir is one of the great attractions to tourists visiting Alaska, since steamers can approach within a short distance. Its front is an overhanging cliff which resembles bluish-white rock, worn and rugged; from this front, icebergs are constantly breaking with a loud crash and falling into the sea.

R.H.W.

#### MOVING SLOWLY TOWARD THE SEA

Above, a near view of Mendenhall Glacier, on South Island, New Zealand. Below, a river of ice and snow is the Argentiere Glacier, in Haute Savoie province, in the French Alps.

**Related Subjects.** The following articles in these volumes will be interesting and helpful in connection with the above:

Alps  
Erosion  
Fiord  
Geology

Glacial Epoch  
Glacier National Park  
Iceberg  
Moraine

#### GLACIER BAY MONUMENT. See MONUMENTS, NATIONAL.

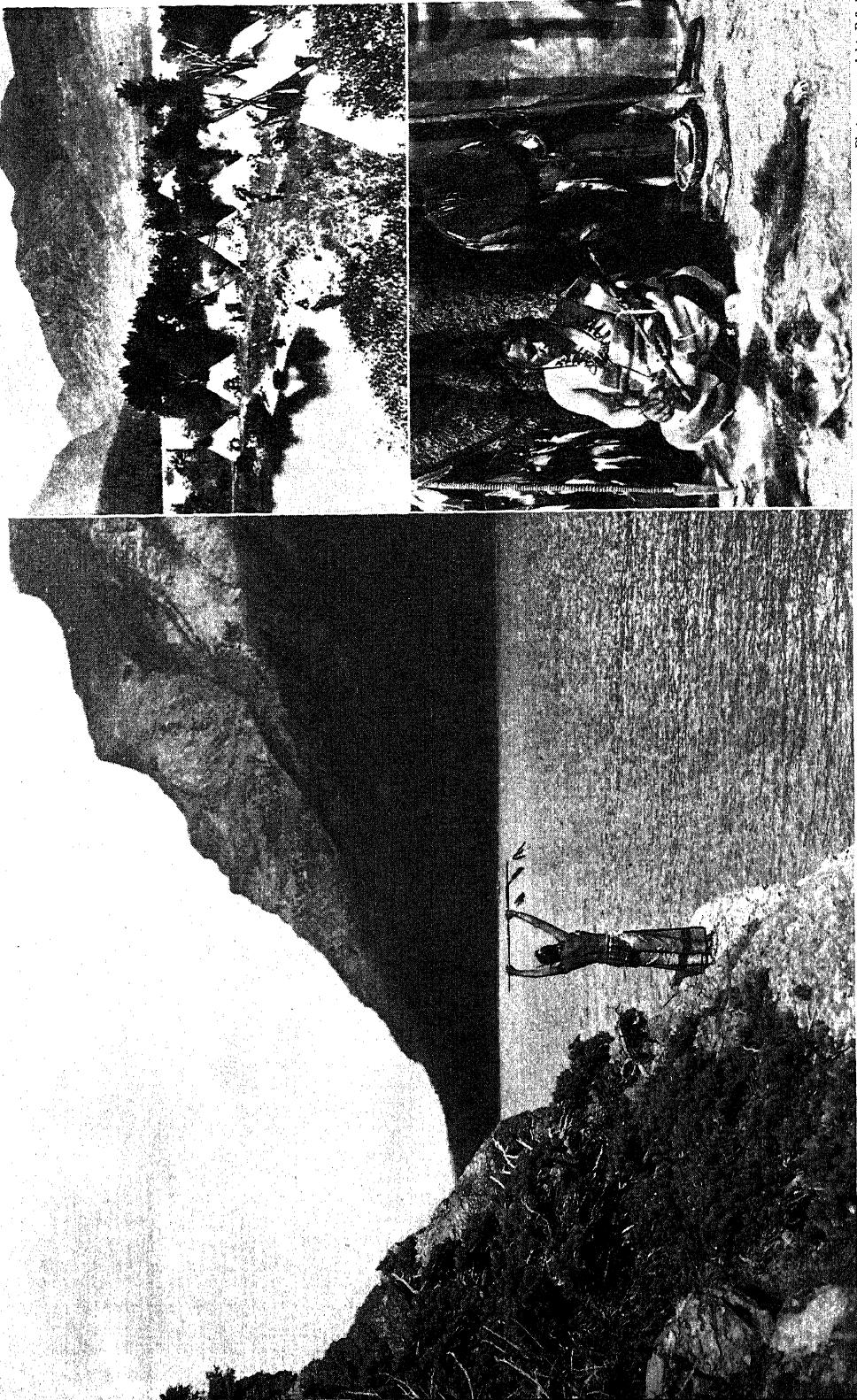
**GLACIER NATIONAL PARK.** Of this region of romantic beauty, it has been well said that "there is more geography to the square mile than can be found in any other equal area anywhere else on this round earth." The park is situated in Northern Montana; on the north is the international boundary line between the United States and Canada, on the east is the Blackfeet Indian Reservation, on the west is Flathead River, and the southern limits are marked by the line of the Great Northern Railway. Adjoining the park on the north is the great Canadian forest and game preserve, the Rocky Mountains National Park.

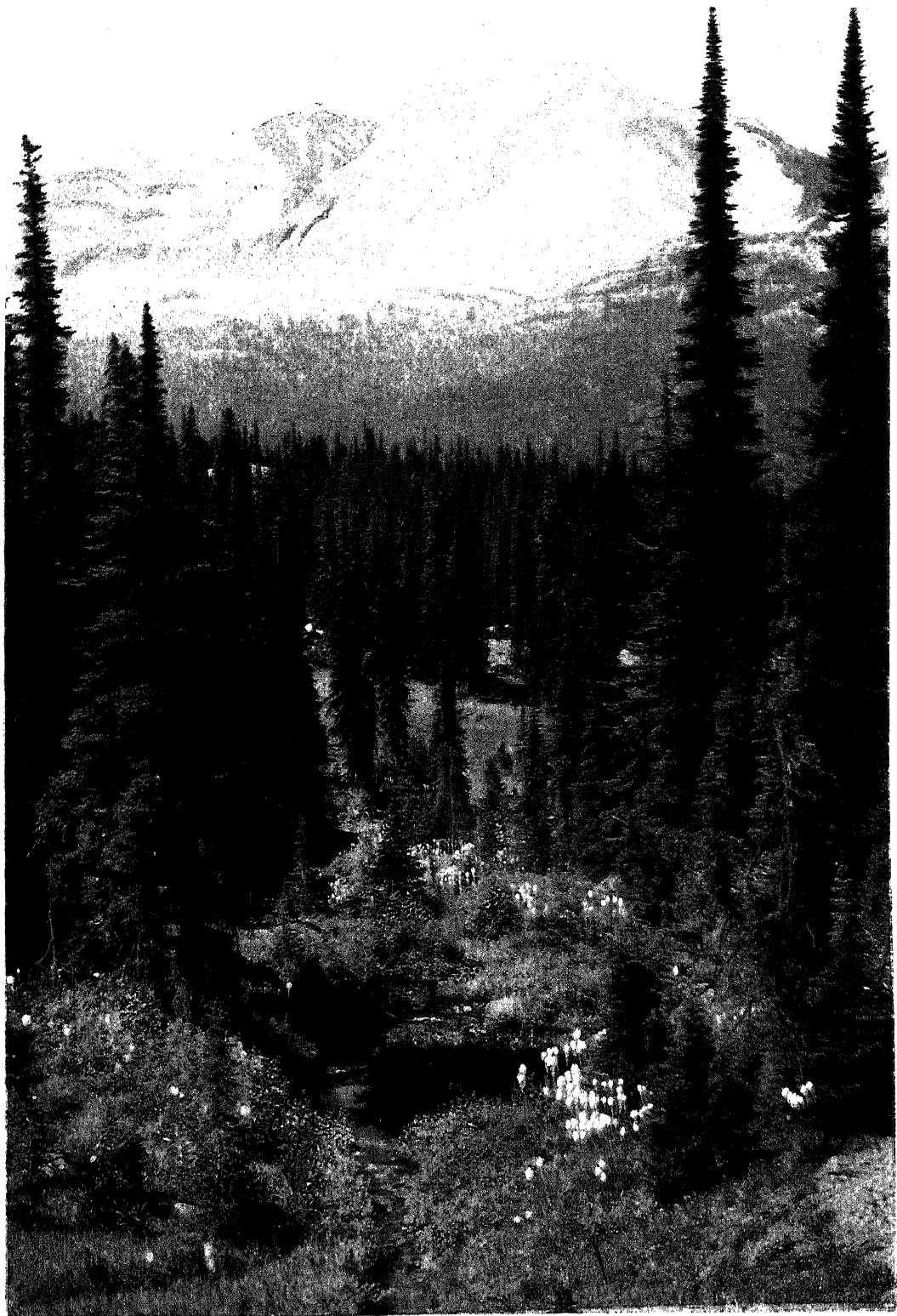
The area included in the park, about 1,500 square miles, was once set aside by the government as a part of the Blackfeet Indian Reservation. Later it was taken from the Indians, with their consent, because it was believed that further explorations might disclose valuable mineral deposits. This hope, however, was not realized, and finally, by act of Congress in February, 1910, it was set aside as a national recreation ground.

**The Glaciers.** The park takes its name from the glaciers, about sixty in number, which vary in size from a few acres to several square miles. Blackfeet Glacier, nearly five miles square, is the largest, and is said to be the most beautiful

**Red Men in the Park.** Blackfoot medicine man greeting the sun on the shore of Two Medicine Lake. Upper right, a summer Indian tepee village. Below, from Glacier National Park, posed photograph of a Blackfoot medicine man. All pictures are from Glacier National Park.

Photo: upper right, P & A

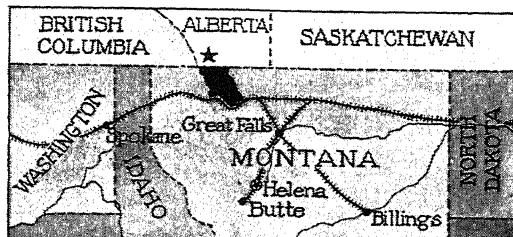




In Glacier National Park. Trails along the mountain side, meadows carpeted with bloom, massive snowfields and towering glaciers—an American wonderland.



glacier in the United States. It is spread out, at an elevation of about 8,000 feet, on the north slope of Mount Jackson (10,023) and



LOCATION MAP

Glacier National Park is in Northwestern Montana. The star, across the international boundary, marks the location of Rocky Mountains National Park.

Blackfoot Mountain (9,597); on the south slopes of these mountains are the Harrison and Pumpelly glaciers. These glaciers are now separated by the Continental Divide, but ages ago they were a part of a vast ice-sheet which covered the entire region. About six miles to the west of Blackfeet Glacier is the Sperry Glacier, which discharges its melting waters over steep, almost vertical and rocky walls into Avalanche Basin. These are only the most notable of the glaciers; Rainbow, Grinnell, Sexton, and Red Eagle are worthy of mention.

**Mountains.** The Glacier National Park is not more noted for its glaciers than for its gigantic mountain masses, its picturesque peaks and lakes, and its cliffs, thousands of feet high. The main range of the Rocky Mountains extends from north to south almost directly through the center of the park. The Continental Divide here has an average altitude of 7,000 feet, but many of the peaks reach 9,000 or 10,000 feet. Many of them have never been climbed by man. The loftiest peak is Mount Cleveland (10,438 feet), in the northern part of the park. Mount Jackson, Mount Siyeh, and Stimson Mountain also have altitudes of more than 10,000 feet, while Mount James, Rising Wolf Mountain, Flinch Peak, Pinchot Mountain, Chief Mountain, Little Chief Mountain, Gould Mountain, and a dozen others exceed 9,000 feet. Squaw Mountain, one of the smaller peaks, is so named because the rocky outline of a squaw is distinctly visible on its southern slope. Triple Divide Mountain (8,001 feet) is called the "roof of the Continent"; from its summit waters flow in three directions—northward through Saint Mary's Lake and River to Hudson Bay; westward through the Flathead River into the Columbia River and thence to the Pacific Ocean; and southward through the Cutbank, Missouri, and Mississippi rivers into the Gulf of Mexico and the Atlantic.

One of the most impressive peaks is Going-to-the-Sun Mountain, whose summit towers a

mile above the western end of Upper Saint Mary's Lake. The Indian name of this mountain is Mah-tah-peo O-stook-sis Meh-stuck, which means "The face of Sour Spirit, who went to the Sun after his work was done." According to the legend, Sour Spirit was a messenger sent by the Great Sun to the Blackfeet Indians. When he had finished his work of teaching them all the arts of Indian life, he returned to the Lodge of the Sun-God. As proof of the truth of this story, the Indians point to the great stone face on the side of the mountain, left there by the Sour Spirit when he returned to the Sun, so that all men might see and believe.

**Lakes.** Of all the 250 lakes in the park, perhaps the most beautiful is the Upper Saint Mary's, from whose western shore rises Going-to-the-Sun Mountain. It lies at an altitude of 4,500 feet, is about ten miles long, and is completely surrounded by mountains except at the point where the Saint Mary's River carries its surplus waters into the Lower Saint Mary's Lake. The Saint Mary's Lakes are on the east slope of the Continental Divide, but the largest lake, Lake McDonald, is on the west slope. It is eleven miles long, and has an average width of one and a half miles. Like Upper Saint Mary's Lake, it lies in a depression surrounded by great peaks rising 3,000 to 5,000 feet above its surface.

Lake McDermott, though one of the smallest lakes in the park, is also one of the most famous, for it is in the heart of a region of great beauty. In its waters are reflected the outlines of Gould Mountain and other peaks, and issuing from its southern end are the lovely McDermott Falls. Near the falls is a permanent camp, which is the headquarters for side trips to Iceberg Lake, Grinnell Glacier, and other points of interest.

Iceberg Lake is the only lake of its kind in North America. It is only one-half mile long, but it is one of the scenic features of the park. At one end is a small glacier, from which great blocks of ice, several hundred feet high and weighing thousands of tons, frequently break off and slide into the water. The altitude (6,000 feet) is so high that even on the warmest summer days there are always icebergs, large and small, floating in the lake, for the water never gets warm enough to melt the ice completely. Glacier National Park was once the "happy hunting grounds" of the Blackfeet Indians, but Iceberg Lake was thought to be the home of lost souls and troubled spirits.

Avalanche Lake, not far from Lake McDonald, is another beautiful, though small, body of water. The trail leading to it seems to emerge through a hole in the mountains, and discloses to the astonished traveler a green-bordered little lake, into whose quiet



In Glacier National Park. Connected in periods of high water by a waterfall that drops 1,500 feet are lakes Ellen Wilson (above) and Little Saint Mary's. The upper lake was named for the first wife of Woodrow Wilson.

waters four streams tumble noisily. These streams, carrying the waters from Sperry Glacier, plunge almost headlong over a rocky precipice 2,000 feet high.

**Animal Life.** The animals of the park are protected by law, and killing, wounding, or capturing any bird or wild animal is an offense punishable by heavy fines. For this reason the Rocky Mountain goats and sheep roam in peace, and many bears have become so tame that they wait on the outskirts of the camps to be fed. A few moose and elk also frequent the park, and deer are common. Antelopes, coyotes, wolves, and lynxes abound, and geese, ducks, and other game birds are sometimes seen in the lower altitudes. The streams and lakes are well stocked with fish, and the park deserves its name of "Fisherman's Paradise." One of the greatest fishing trips in the world may be taken from Belton, the western entrance to the park, down the Flathead River to Columbia Falls, a distance of twenty miles. Trout are found here probably in greater numbers than in any other waters in North America.

**Transportation and Accommodations.** There are two entrances to the park, the eastern at Glacier Park station, the western at Belton, both on the main line of the Great Northern Railway. Within the park, trips may be taken on foot, on horseback, by stagecoach, or by automobiles. There are many excellent roads, but the higher and remoter points are accessible only to pedestrians or equestrians. Launches are operated on Lake McDonald and Upper Saint Mary's Lake.

The accommodations for visitors are excellent, and suit all tastes and purses. A large modern hotel is located at the Glacier Park station, and dotting the entire area is a series of camps convenient to the points of scenic interest. These camps, which are placed not more than a day's walk apart, are groups of small log buildings of the Swiss chalet type. Horses and camping equipment may be rented or purchased, and guides are available at all times. The charges for hotel accommodations and all other services are regulated by the United States government, through the Secretary of the Interior, who has immediate control of all national parks.

**GLACIER PARK.** See PARKS, NATIONAL (Parks of Canada).

**GLADIATORS**, *glad' i a torz*, men of courage and strength, who, armed only with small shields and short steel swords, fought and killed each other, or placed themselves at the mercy of hungry wild beasts, in the days of ancient Rome. At first, these contests were held in honor of heroes who died in battle, the earliest exhibition recorded being in 264 B.C., at the funeral of the father of Marcus and Decimus Brutus. Then, prisoners, slaves,

or condemned criminals were sacrificed. At a later period, freemen also fought in the arena, for hire or merely from choice; and still later, men of senatorial rank, and even women, fought, and all to gratify the brutal passions of the people of the day, who found entertainment in the shedding of blood. Schools for gladiators were conducted, and the practice grew to such proportions that, it is said, the warlike Roman emperor, Trajan, gave one show lasting over 100 days, during which 2,000 men fought to



Photo: Visual Education Service

#### GLADIOLUS

the death. Such exhibitions were finally abolished by Theodosius, in A.D. 500.

If a gladiator was overpowered in these contests the spectators indicated, by pointing thumbs up or thumbs down, whether he should be killed or spared. The victor, if a prisoner, sometimes received his freedom, at other times a palm or garland. One of the most famous gladiators of history was Spartacus, a Thracian slave, who incited the War of the Gladiators, 73-71 B.C. See COLOSSEUM; SPARTACUS.

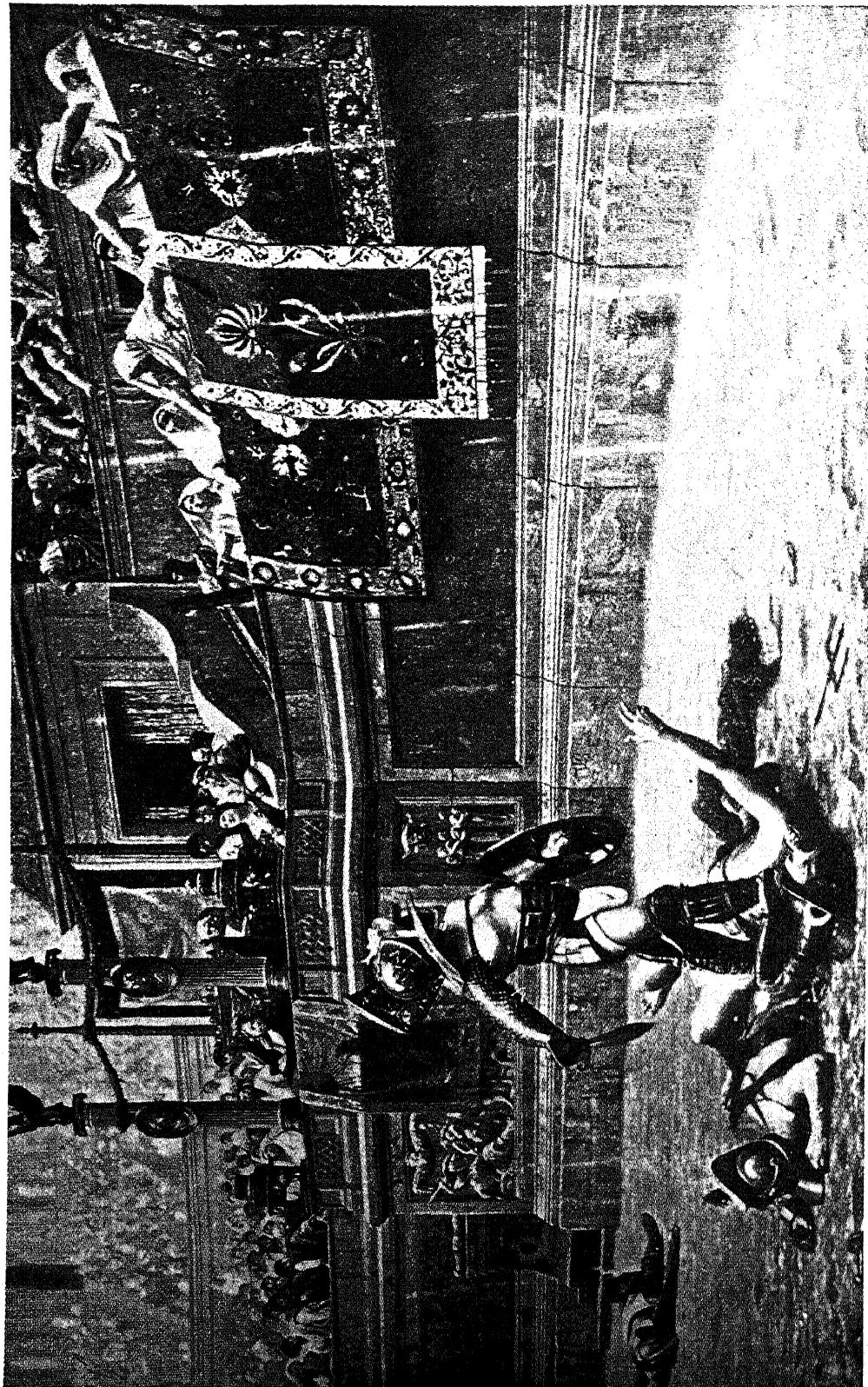
**In Literature and Art.** The story of Spartacus inspired that favorite American recitation, *The Gladiator's Appeal*, by Elijah Kellogg.

Among gladiatorial statues are the celebrated marble one in Rome, *The Fighting or Borghese Gladiator*, and *The Dying Gaul* or *Gladiator*, the original of which is in Paris (illustration on page 2828).

**GLADIOLUS**, *gla dī' o lus*, or *glad ih o' lus*, any one of a genus of popular garden plants grown extensively in America and Europe. Gladioli are named for their long, sword-shaped

From the painting by Gréme

The Gladiator. The vanquished is pleading for mercy; the victor awaits the sign from the multitude. "Thumbs down" seals the victim's fate.



leaves; the name (from the Latin) means *little dagger*. They also have been given the name *sword lily*. Their large, irregular, tube-shaped flowers are arranged in long, one-sided clusters, the lower blossoms opening first. If a spike of gladiolus is cut when just the lower flowers are open, the buds above will open in succession and keep fresh for a week or ten days. The colors range through all the shades and tints of red to white, and even a blue gladiolus has been produced. Luther Burbank worked extensively with this plant, producing blossoms on all sides of the stem instead of on one side only, and creating larger flowers and rich combinations of color.

Gladioli are bulbous plants that reproduce by the formation of new corms above the old ones (see CORM). They require a good loamy soil, sunlight, and free watering, and are among the most satisfactory of summer flowers. B.M.D.

**Classification.** Gladioli form a genus of the iris family, *Iridaceae*. The hundreds of modern varieties have largely replaced natural species in gardens and greenhouses.

**GLADSTONE**, *glad' ston*, WILLIAM EWART (1809-1898), a profound scholar and statesman of Great Britain, four times Prime Minister, and the most famous of the ministers and political leaders of the long reign of Queen Victoria. His name will forever be associated with those movements which are identified with the progress of English democracy—free trade, equal taxation, the education of the masses, and the extension of suffrage—and he was the first Prime Minister to take up the fight for Irish Home Rule. He was born on December 29, 1809, in Liverpool, of Scottish parentage, and was educated at Eton College and at Christ Church, Oxford University. At the age of twenty-four, he entered Parliament, where he gave his support to the Tory faction under the leadership of Sir Robert Peel. Between 1845 and 1847, he was Secretary of State for the Colonies in Peel's Cabinet, but during this period was not a member of Parliament. To that body he was re-elected in 1847.

During the next few years, in which he was gradually swinging away from Tory principles to Liberalism, Gladstone rose steadily in power and influence, and as Chancellor of the Exchequer, a post which he held at three different times, he prepared budgets that showed marvelous grasp of financial problems. In 1865 he became the Liberal leader in the House of Commons, and three years later began his first term as Prime Minister. In 1869 he carried his bill for the disestablishment of the Irish Church, and in 1860 a bill for the reform of the Irish land system was passed. At this time, also, a system of public schools for the poorer classes was established, and the use of the ballot in voting was introduced. In 1874

the Conservatives regained their power, and Gladstone was succeeded in the Premiership by Disraeli.

Gladstone again came into prominence as a severe critic of the foreign policy of the Conservative Ministry, and in 1880, when the country was carried by the Liberals, he became Prime Minister a second time. During his second Ministry, which ended in 1885, about 2,000,000 new voters were given suffrage rights, and a fairer arrangement of Parliamentary districts was effected.

Meanwhile, the movement for Irish Home Rule was making great progress, and when Gladstone became Premier for the third time, in 1886, he announced that Home Rule was to be a feature of the Liberal program. In April of that year, the first Home Rule bill was introduced into Parliament. When it failed to pass in the House of Commons, Parliament was dissolved, and in the resulting elections the Liberals were defeated. In 1892 the tide again turned, and Gladstone took up for the fourth and last time the duties of the Premiership. In 1893 his second Home Rule bill passed in the House of Commons but was rejected by the House of Lords, and a year later, at the age of eighty-five, he laid aside the burdens of public life.

**In Literature.** Gladstone was the author of several books, among which are *Gleanings from Past Years* and *Studies on Homer and the Homeric Age*.

**Related Subjects.** The following articles in these volumes will throw light on Gladstone's activities, and on the history of the times in which he lived:

|                    |          |
|--------------------|----------|
| Chancellor         | Liberal  |
| Conservative       | Premier  |
| Disraeli, Benjamin | Tory     |
| Home Rule          | Victoria |

**GLANDERS**, a violent, infectious disease to which horses, asses, and mules are susceptible, but which only occasionally attacks cattle, sheep, and pigs. The disease was common among horses in the days of the ancient Romans, but no cure has ever been discovered. The causal bacillus was isolated in 1882. The injection of *mallein*, a substance prepared from the glanders bacillus, is a means of determining whether the disease has been contracted. It has no effect on a healthy animal, except to cause a rise of temperature.

Acute attacks begin with chills and fever, which are followed by discharge of mucus from

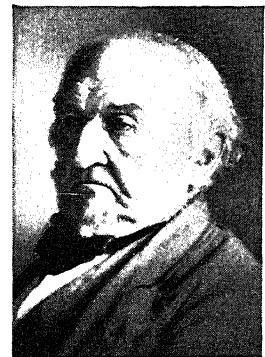


Photo: Brown Bros.

**WILLIAM E. GLADSTONE**  
The most powerful British statesman of the nineteenth century.

the nose, and the formation of ulcers upon the partition between the nostrils. The lymphatic glands swell, and the animal succumbs in one to two weeks. In the chronic forms, the symptoms present themselves gradually, and the affected animal may live for years, suffering intermittent attacks but infecting other animals in large numbers. Chronic glanders, accompanied by swelling of the lymphatic glands under the skin, is known as *farcy*, the enlargements being called *farcy buttons*. These burst and form painful ulcers that heal very slowly. To prevent the spread of glanders, it is necessary to kill the afflicted animal and thoroughly disinfect stables, harness, and everything with which it has come in contact. Dogs, cats, and wild animals may contract the disease by eating the flesh of glandered horses. Men may contract fatal glanders by exposure to the nasal discharge of sick animals.

**GLANDS** are specially formed parts of the body, consisting of peculiar cells that manufacture or separate from the blood special substances which may be discharged from the body or may be utilized for various purposes. There are two main kinds of glands: those of external secretion, called *true secreting glands*; and those of internal secretion, called *ductless glands*. The former are represented by the salivary glands of the mouth; the stomach glands which secrete gastric juice; the glands that secrete the intestinal juices; tear glands, sweat glands, mammary (milk) glands, lymph glands, the kidneys, the pancreas, which also has an internal secretion, and the liver. These glands pour out their secretions on the skin or mucous membranes, or, as in case of the kidneys, expel them from the body as excretions.

**Ductless Glands.** The study of the ductless glands is called *endocrinology*. Our knowledge of these glands has advanced rapidly since the beginning of the present century, but scientists still have much to learn about them. It is known that by their secretion of substances called *hormones*, which are conveyed to other organs by the blood, they affect the nervous system, regulate the state of the emotions, are responsible for the size and shape of the body parts, and determine the characteristics of sex. The important ductless glands include the following:

(1) The *thyroid* is a large gland found at the front and sides of the larynx. In health, it secretes a most important substance, the main functions of which are to maintain a normal metabolism, to bring about a proper interaction of the secretions of the other ductless glands, and to govern normal development, or growth. When the thyroid is enlarged, the condition is commonly known as *goiter*. When a child is deficient in thyroid secretion, he is undeveloped and idiot-like. Such children are known as *cretins*. When the thyroid is overactive, the person is rendered highly nervous and unstable.

(2) The *pituitary body* is a small gland found in the brain. When enlarged, it causes excessive development of parts of the body, usually the face, hands, and feet. When the gland is deficient, the person becomes excessively fat and childlike.

(3) The *adrenals*, or *suprarenals*, are located above the kidneys. The secretion of these glands acts in many and very important ways upon the body. Most outstanding, perhaps, is its action upon the blood pressure, which it tends to raise. It has been found that secretion from these glands is abundant in extreme emotion, and that it is important in preparing the body for immediate action in such situations. Physicians have made an extract of the glands known as *adrenalin*, which has important uses in medicine.

(4) *The Pancreas.* Although there is an external secretion of the pancreas important in digestion, there is also an internal secretion which is extremely important. It is manufactured in a particular part of the pancreas known as the *islands of Langerhans*. The body is dependent upon the presence of this secretion for its ability to burn carbohydrates. When the secretion is lacking, the condition known as diabetes results. An extract of the pancreas containing this secretion has been made and is known as *insulin*. When this is given to people with diabetes, they are usually able to continue their work as normal individuals.

(5) *The Sex Glands.* The internal secretion from these glands is important in bringing about many of the characteristics which distinguish men from women, such as stature and difference in voice. These glands are known as *gonads*.

**Gland Transplantation.** Experiments in transplanting monkey and sheep glands into the bodies of human beings, to effect rejuvenation, have been carried on by many eminent investigators, notably Dr. Eugen Steinach of Vienna. Many sensational stories have been told of the effects of these experiments, but most of these reports are exaggerations. There is no indication at the present time that any good can come of such procedures. K.A.E.

**Related Subjects.** The reader is referred in these volumes to the following articles:

|                  |              |
|------------------|--------------|
| Adrenalin        | Membranes    |
| Bile             | Metabolism   |
| Diabetes         | Milk         |
| Digestion        | Mucus        |
| Goiter           | Pancreas     |
| Insulin          | Perspiration |
| Intestine        | Saliva       |
| Kidneys          | Secretion    |
| Lachrymal Glands | Spleen       |
| Liver            | Stomach      |
| Lymph            | Urine        |

**GLASGOW**, *glas' ko*, next to London the largest city in Great Britain, and the most important city in Scotland. It is located near the Firth of Clyde, on the western coast. Situated in the midst of a district producing an abundance of coal and iron, Glasgow is one of the busiest industrial cities of the world. Its splendid harbor on the Clyde River, accommodating vessels drawing twenty-six feet of water, makes it also a great commercial

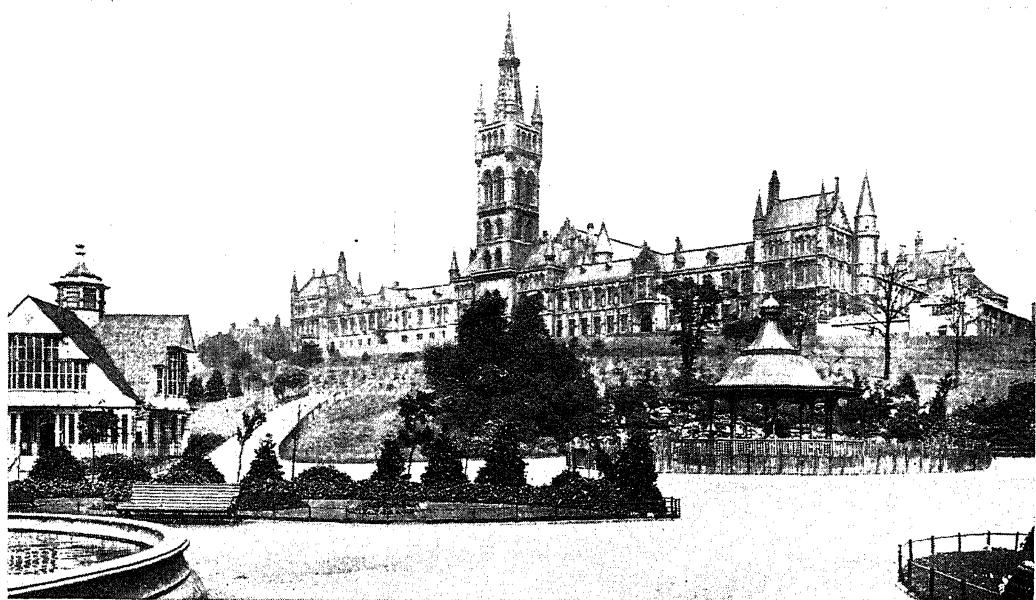


Photo: U &amp; U

A VIEW OF THE UNIVERSITY OF GLASGOW

port. Of costly construction, the great system of docks necessitated the taxation of the people for forty years. Further dock accommodations were begun in 1924. The city is the world's greatest center of shipbuilding and its allied industries. Woolen, cotton, and linen goods, machinery, coal, paper, chemicals, and whisky are the chief exports.

Glasgow enjoys the reputation of being one of the best-governed municipalities in the world; its system of municipal ownership of public utilities has been studied and copied by American and Canadian cities.

By special act of Parliament, each of the various departments of the city is supervised by a "trust." The police trust manages the police force, the market trust deals with market needs, and so on. Under the skilful management of its sanitary department, the death rate of the city has been reduced over one-half.

Congested housing conditions led to the incorporation of an extensive area of about 11,000 acres in 1926. The municipal lodging houses are models and are conducted so as to help the poor without making paupers of them. During recent years, by the abatement of the smoke nuisance, much has also been done to improve the general appearance of the city. Many streets have been widened and unsightly buildings have been destroyed. Glasgow is excelled in beauty by few British cities.

The water supply of the city is drawn a distance of forty-two miles, from Loch Katrine, the lake referred to in Scott's *Lady of the Lake*. The cathedral, erected in the twelfth century,

is in the early English style of architecture, and is noted for its large and elaborately decorated crypt.

The University of Glasgow was founded in 1451, and it was later endowed by Mary Queen of Scots and her son, James I of England. It is one of the four great seats of learning in Scotland.

Glasgow was founded in A.D. 560, but did not rise to any importance until about 1116. From the time of the union of Scotland and England, in 1707, Glasgow has steadily risen in commercial and educational importance. Population, over 1,057,000, including suburbs.

**GLASGOW**, ELLEN ANDERSON GHOSTON (1874- ), an American novelist who has attracted wide interest through her skilful portrayal of life in the Old South. She was born in Richmond, Va., and reared in a strict Southern home, which, in her childhood, was still struggling with the hardships of post-war reconstruction. She never attended a public school, but was educated privately. Her first novel, *The Descendants*, published anonymously when she was eighteen years old, was thought to be the work of a mature male author.

Miss Glasgow is a writer of distinction. She slashes with the rapier of irony and wit the old romantic South of gallant, julep-sipping colonels, lovely ladies, and devoted negroes. Her Virginia is a realistic one, of the older countryside resentfully yielding a bitter livelihood. She sings the plain song of toil and poverty, of defeat and frustration. False traditions and amiable humbugs that obscure the fine and vigorous fall before her onslaughts. Her

best books deal with the period just before and after the War of Secession.

**Her Principal Works.** *Barren Ground*, published in 1925, is one of her finest novels. It is the story of a courageous woman who triumphantly vindicates the idea that romance is not enough to fill a woman's life. Her *Romantic Comedians* (1926) is a brilliant exposition of the folly of exaggerated romance in old age. *Virginia*, a tale of a helpless Southern woman, is also popular. Others are *The Battle-Ground*, *Delicrance*, *Life and Gabriella*, *The Builders*, *The Wheel of Life*, and *They Stoop to Folly*.

**GLASS**, one of those familiar substances which are put to so many uses in our everyday life that we accept them as a matter of course and seldom reflect upon their history. There is one peculiar feature with respect to glass manufacture that is not true of almost any other great industry. While the best modern methods of glass-making are followed in most factories, it is a fact also that medieval methods have not been entirely abandoned. The latter condition may be due, in some instances, to lack of capital for expansion along modern lines, but it is believed that in some factories, at least, there lingers such veneration for tradition that old methods still survive.

A bit of history may help one to understand this adherence to the old practices. The art of glass-making was once confined exclusively to the nobility and the gentry, and it is thought that some manufacturers are swayed by a tradition of conservatism, bequeathed to them by the original patrician craftsmen. Here may be the explanation of the survival in the glass industry of medieval hand methods, side by side with purely mechanical methods that have been highly specialized by inventive genius. Human lung power and the hand blowpipe still compete, though not successfully, with compressed air and electrically driven machinery in the manufacture of bottles. As late as 1920, there were more than sixty factories in the United States, and hundreds in Europe, in which window glass was made by mouth and hand, though machines that made it better and ten times as fast had been perfected fully twenty years earlier. The number of such American factories decreased rapidly after that date, and there are none to-day.

Window glass is now made in many modern factories by machines which draw the glass into a long cylinder; then it is cut and flattened, and again cut into desired sizes. Most factories, however, now produce window glass by sheet-drawing machines; the process is known as the *Colburn* or *Fourcault* process.

There are machines that with very slight unskilled attendance can make 200 bottles a minute; it is true yet that within a few miles there may be a factory where highly paid and very skilful artisans blow bottles by lung power.

**Our Debt to Glass.** Common as it is, glass adds more to our daily comfort and happiness than the costliest gems that the mines can yield. Our homes would be dreary places, indeed, had we no windowpanes to give us light and through which to view the world about us; and no one would care to go back to the times when people drank out of gourds and horns instead of glass goblets, and used bottles made of skins.

Glass has become indispensable in the home, in the arts, and in the commercial world. The scientist can add his testimony concerning the value of a substance which forms the lenses of the microscope and the telescope, and which is used in countless other devices and instruments. The merchant in the great city, who must utilize every available inch of space, transforms the basement floor of his huge establishment into a miniature department store, and solves the problem of light by having the sidewalks adjoining the building constructed of iron frames containing many glass prisms. In the lovely stained-glass windows of great cathedrals and in beautiful vases and costly tableware, we see something of the artistic possibilities of this very useful substance.

**Historical.** The origin of glass-making is lost in antiquity. A fanciful story told by the Roman writer Pliny credits a band of Phoenician merchants with the discovery of the art. According to this legend, as the merchants were returning from Egypt, they landed on the coast of Palestine, camped on a sandy beach of the River Belus, and there built a fire. Having placed some blocks of niter under their cooking vessels to protect them from the fire, they saw the substance melt, mingle with the sand, and form a liquid stream of glass. Pliny, however, does not explain how the mild heat of an open fire could accomplish what to-day requires the intense heat of a modern furnace, so his narrative is regarded merely as an attempt to account for the origin of an art that had reached a considerable degree of perfection in Roman times.

**What Glass Is.** Glass is not a natural substance, like gold, silver, or coal, but is an artificial compound, made by melting together certain ingredients at a very high temperature (from 1832° to 2732° F.). The principal materials used are: (1) sand (or crushed quartz or flint), (2) lime, and (3) sodium carbonate, potassium carbonate, or sodium sulphate. For various forms of glass, other materials are included in varying proportions, such as manganese, cobalt, copper, zinc, tin, arsenic, salt-peter, etc.; pigments for coloring are also added. Cheap grades of glass are made from common sea and river sand, but for the manufacture of better qualities, the sand is quarried. Lime is found in nearly all varieties, but lead oxide is substituted in making those which

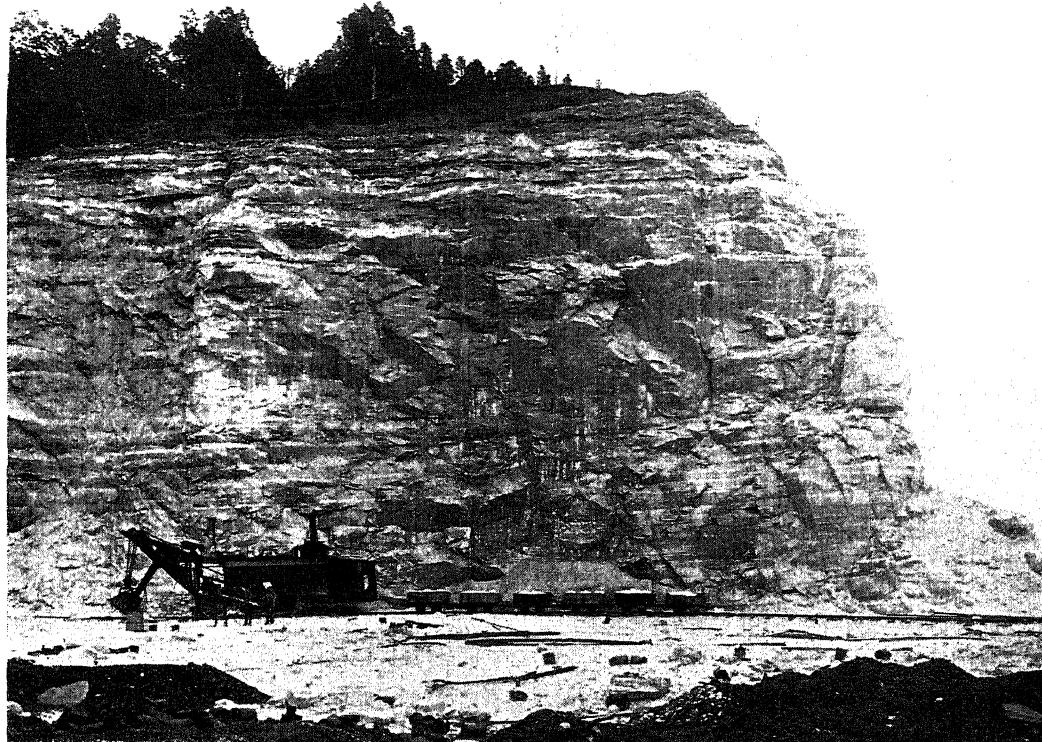


Photo: Illinois Glass Co.

## THE FIRST STEP IN THE MAKING OF A GLASS BOTTLE

Trainloads of pure silica sand are taken from great hills like the one shown, and transported to the glass factory. The above scene is in Missouri.

require a brilliant luster and a high degree of transparency, such as *flint* glass, used for lamp chimneys, for cut glassware, and for some of the lenses of optical instruments, and the *strass*, or *paste*, used in imitation diamonds. The lime has the effect of softening the glass, and the injudicious use of this material has caused many a beautiful piece of tableware to become tarnished and even ruined after a year of service. Potash-lime glass is much harder and less easily melted than soda-lime glass, and is used for making chemical apparatus. It is called *hard*, or *Bohemian*, glass.

**Processes of Manufacture.** In preparing the materials which go into the making of the better grades of glass, the manufacturer puts forth every possible effort to free the sand from impurities. In many cases, it is stirred in great quantities of water, then burned in the flames of a fire, and, finally, sifted through copper gauze. Of the impurities which enter it, iron is the most troublesome; if there is present over one-half of one per cent of iron in the sand, the latter cannot be used for the manufacture of colorless glass. In the seventeenth century, ground flint was used in the best glass, because it was purer than any sand

then available. Hence the name *flint glass*, which, curiously enough, is to-day applied to a variety of glass that is comparatively soft, and in the manufacture of which no flint is used. The mixing of the ingredients into what the glass-maker calls the "batch" is a process that requires the services of an expert chemist; in the best modern factories the batch is always prepared according to special chemical formulas.

The melting furnace may be either of two general types—the *pot furnace* or the *tank furnace*. In the former, the ingredients are melted in huge pots made of fire clay, arranged in a circle around a central fire, at the base of a huge chimney. As these vessels are very difficult to make and of uncertain durability, the tank furnace, heated by gas or electricity, has come into general use in the glass-making industry. This type of furnace is provided with a tank in which the ingredients are melted and from which the molten mass is drawn. In the largest factories these furnaces are seventy-five feet long, sixteen feet wide, and five feet deep. They are usually worked without interruption, new material being fed into them at one end as the supply of melted glass is drawn out at the opposite end.

*Window Glass.* Window glass was formerly made entirely by hand labor, and though machines for various steps in its modern manufacture are very generally employed, the older process well deserves consideration. When performed by hand, the process is



Photo: O. R. O. C.

"THE HARVEST OF GRAPES"

A beautiful bowl and plate in Swedish crystal glassware.

essentially as follows: For each part of the operation, there is one man especially trained for the work. The first step is the gathering. The gatherer dips a long iron blowpipe into the white-hot glass, and skilfully forms on the end a mass of the substance, weighing from twenty to forty pounds. This ball of glass he turns in an iron mold until it assumes the shape of a pear, and then passes it to the blower, who is the master workman of the factory.

The blower, by a process of blowing, swinging, and revolving the mass, shapes it into the form of a cylinder, sometimes as many inches long as himself. When it has cooled somewhat, he holds the end of the cylinder in the furnace, blows into the blowpipe, and then covers the mouthpiece with his thumb. The air, thus imprisoned, and expanding with the heat, splits an opening in the end of the cylinder, which the blower enlarges by revolving the end swiftly in the furnace. When the hole is as large as the diameter of the cylinder, and the mass is cooled to cherry-red heat, an assistant detaches the glass from the blowpipe, and the cylinder is cracked lengthwise with a red-hot iron or a diamond on a long handle. The opened cylinder, with the split side up, is next placed on a fire-clay table, which revolves in an oven. The heat soon flattens the cylinder into an irregular surface, which the next workman, the flattener, smooths out with a tool called the *polisseur* (French for *polisher*). This is an iron rod, to each end of which a block of wood is fastened. The smoothed sheet is next placed in the coolest part of the furnace, and is then removed to the cooling stone. When rigid enough to be moved, it is carried to the annealing chamber.

Annealing is for the purpose of preventing breakage when glass is subjected to changes of temperature, and all articles made from glass undergo this process. This breaking is due to the fact that one surface expands or otherwise dilates before the other has had time to be affected. The objects are slowly heated until the melting point approaches, and are then gradually cooled, the process taking place in a chamber having various compartments of different degrees of temperature. The principle is that the glass, which has been distended by heat, contracts evenly throughout as it cools; and the molecules have time to arrange themselves in a stable position. The glass therefore is made "tough."

Compressed-air machines have been substituted in all large factories for lung power. These handle larger units of molten glass and very greatly increase the output.

*Glass Tableware.* A large part of the ordinary glassware that appears on the table is made by pressing. The press consists of an iron mold, containing the design and ornamentation of the article to be made, and a plunger which is worked by a lever. The gatherer places an iron rod in the molten glass, bringing out a quantity of the substance on the end of it. From this lump, enough glass is cut to make the article, and the mass is dropped into the mold and pressed into shape by the plunger. When this process is completed, the article is taken out and annealed. Some articles are made in two parts; in manufacturing a goblet, for instance, the



FROM ENGLAND

Old Waterford cut-glass specimens.

bowl is shaped in one press and the stem in another. A good deal of the more expensive tableware is made by blowing. In many factories, machines operated by compressed air take the place of the human blower.

*Cut Glass.* In the making of this ornate product, the object is first cast in a mold or is blown, and its plain surface is then marked with the chosen design. It is next held against an iron wheel with sharp edges, which is mounted on a horizontal axis, and which cuts the design into the glass. The face of the wheel is kept supplied with coarse sand and water, which drips from a hopper above. It is not always necessary to trace the design before it is cut into the surface, for a workman of special skill and training is able to complete the work with only his eye for a guide. After the design is cut, the article is held against a

wheel of sandstone, which is so shaped as to have a sharp edge in the middle. The action of this wheel smooths the edges and surfaces made by the cutting wheel; during the process, a small stream of water constantly plays upon it. A wooden wheel supplied with pumice stone next gives a finish and polish to the object, and it is finally cleaned by means of a brush made of spun glass. When all the tiny fragments of glass are removed from the grooves and crevices, the article is washed, and is then ready for the market. Cut glass has lost its popularity as tableware, because it is heavy and hard to keep clean.

*Bottle Glass.* For the methods used in making bottles, see the article BOTTLE (How Bottles Are Made). Illustrations of machinery for bottle-making, however, appear on pages 2836 and 2837.

*Colored Glass.* Oxides of different metals, which are added in small quantities to the usual ingredients, give glass its various colors. Iron produces a pale yellow or a pale green; manganese, a pink, amethyst, or violet. Copper gives a deep green or deep blue, but by adding a reducing agent to take the oxygen from the oxide, the metal copper can be set free in extremely minute particles. This imparts a ruby-red color to the glass. A still finer ruby glass is made by using gold in place of copper oxide. A rich blue is produced by cobalt oxide, a milky white by tin oxide, calcium fluoride, or bone ash, and many beautiful tints by a combination of the various coloring substances. The exquisite stained-glass windows

of many great churches are mosaics of different colored glass, cut and fitted so as to produce a complete design. On others the pictures are painted, and the colors are then burned into the glass. Colored glass, cut into small pieces,

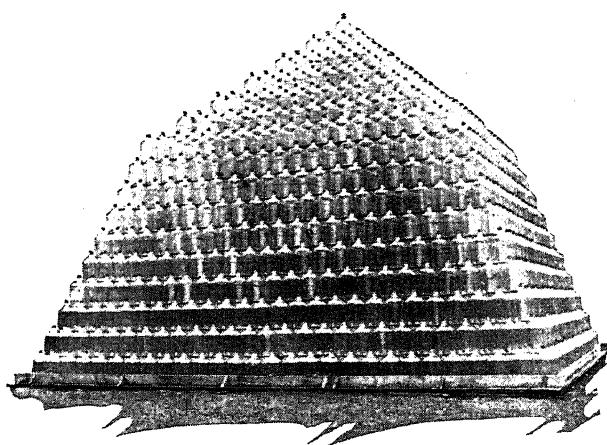
is sometimes seen in the ornamental mosaic work that beautifies the interior of public buildings. Colored glass has the special virtues of holding its color and of not being subject to decay, and it is therefore a valued material for decorative effects. It has also become very popular for tableware, being used for salad plates, glasses, and other dishes.

*Etched Glass* is produced through the agency of hy-

drofluoric acid, which is about the only acid that attacks glass to any marked degree. A thin coat of wax is applied, and the pattern is scratched through it. Then the acid is allowed to follow the lines of the pattern, which is reproduced in the glass.

*Glass That Will Bend.* There is an old legend about a Roman architect who presented to Emperor Tiberius a glass cup, which the latter greatly admired. It was an unusual cup, and hoping to secure royal favor, the architect proceeded to demonstrate its remarkable properties. Asking for the return of the cup, he dashed it to the floor; it did not break, but was merely dented. He restored the cup to its original perfect shape by hammering it. The emperor, amazed, inquired whether others knew the secret of its manufacture; on being informed that no one but the architect himself knew it, he ordered the man beheaded. He feared that if such knowledge were imparted to others, it might make gold and silver less valuable.

The tale may be pure invention, but if it has a basis of fact, glass that will bend is not a new thing in the world. It is new to modern people, however, for only since about 1925 have two Austrians, Pollack and Ripper, produced this new malleable glass (see MALLEABILITY). It is clearer than ordinary glass; it does not shatter on moderate impact with a hard substance, and it bends easily. It is made, by a secret process, of an organic (non-mineral) substance. It is sufficiently hard to be safe from accidental scratching, is flexible



A PYRAMID OF FIVE-GALLON BOTTLES

Thirty tons of glass are pressing down upon the bottom layer.  
In the pile are 6,194 bottles, each weighing eleven pounds.

Photo: Illinois Glass Co.



Photo: Illinois Glass Co.

**Mold Shop Scene.** Above, the pattern-maker. Before a bottle is made, a wood model is prepared, and checked for capacity, style, weight, and finish. When the model has been approved, it is sent to the mold shop. Below, molds used in bottle-making.

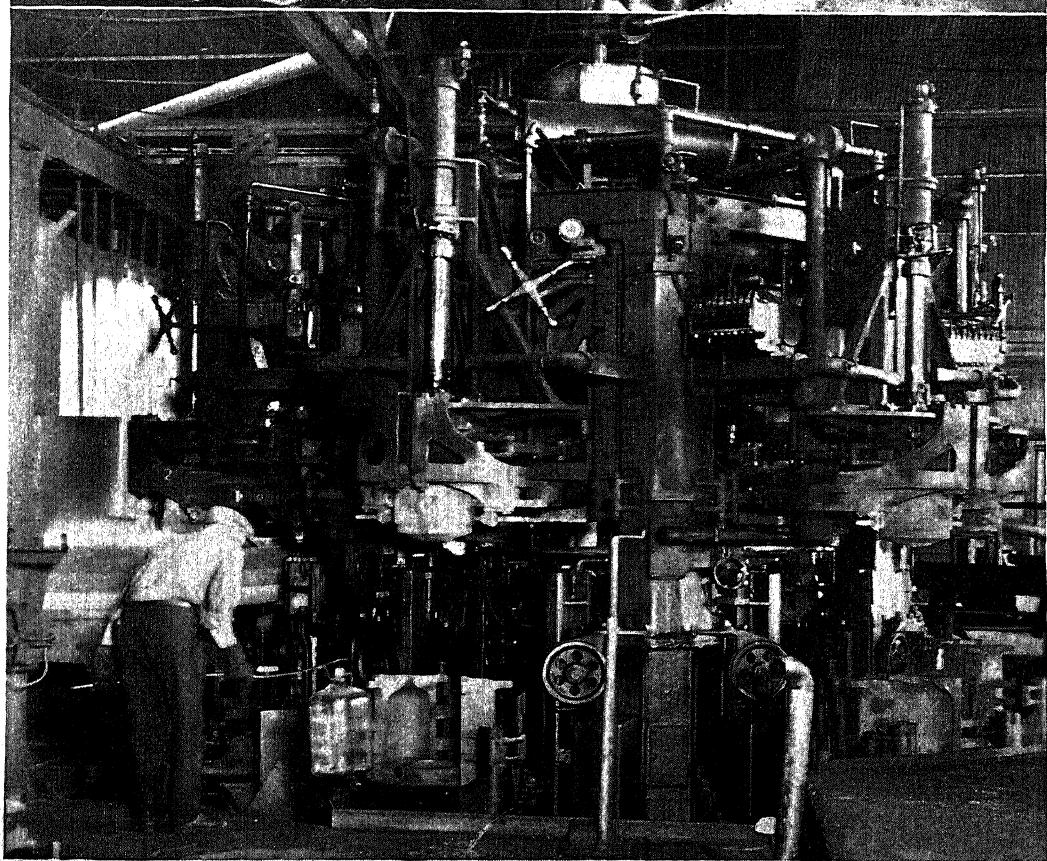
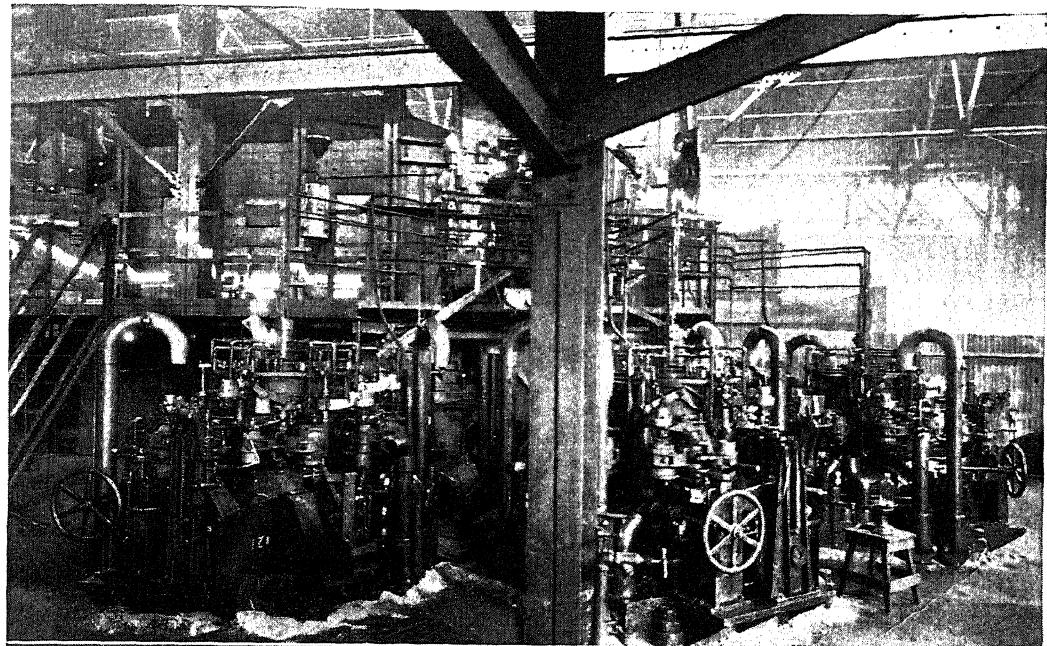
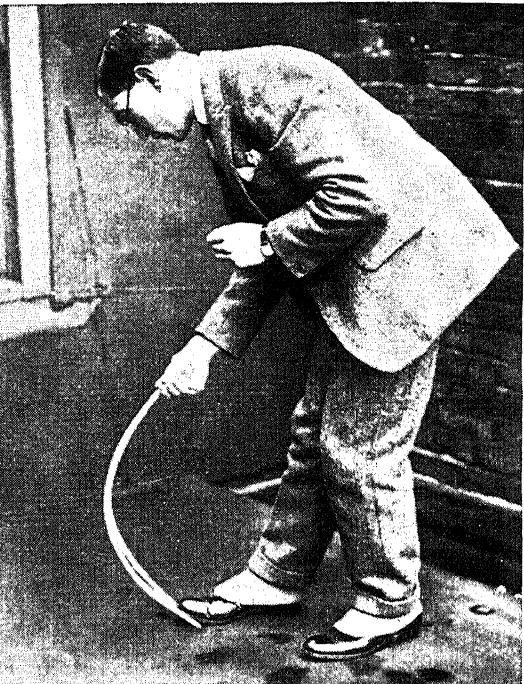


Photo: Illinois Glass Co.

Bottle-Making Machines. Above, at right, a molding machine; at left, the melting furnace. On the platform is a "gob-feed" machine, which takes the molten mass from the furnace and passes it on. Below, a machine which will manufacture 8,000 bottles in twenty-four hours.



Photos: Keystone

## THE WONDERS OF FLEXIBLE GLASS

Flexible "organic glass" was invented by Drs. Fritz Pollock and Kurt Ripper. The glass is non-splinterable, and can be bent and bounced without harm. It can even be had in liquid form, and can be poured from a bottle, as shown in the illustration.

enough to bend to a marked degree under stress, and it can be broken with the bare hands without risk, for the edges of the fracture are not sharp and jagged. These properties recommend the glass for use in automobile windshields and windows.

The claim is made that this glass will absorb any dye, and that delicate vegetable dyes can be used to color it; that it can be made into

fancy umbrella handles, door knobs, imitation meerschaum pipes, and cigarette holders, and in certain instances can be used in place of rubber or vulcanite. A ball of it, when dropped on the floor, has resiliency equal to that of a golf ball.

This substance can be bought in liquid form, and can be poured from a bottle when cold.

W.A.K.

## How Polished Plate Glass Is Made

Generally speaking, the term *plate glass* is used to indicate what is technically known as polished plate glass, and may be defined as a piece of glass having two plane surfaces parallel to each other, which have been produced by grinding and polishing operations. The term is also used in connection with a variety of other products; for instance, rough-rolled plate glass, which is a sheet of glass that has been produced by the process of rolling either between two rolls or between a table and a roller. This product is extensively used for skylights, and in other locations where its function is merely to let in light and keep out the weather. Frequently it is made of glass of inferior quality.

Originally, all polished plate glass was made in two stages—first, the production of the rough plate glass by the casting process, which gives

it its preliminary form; and second, the grinding and polishing operation, which gives it its brilliant plane surface. However, in late years the preliminary sheet has been formed in other ways, such as by drawing the flat sheet directly from the tank, so that polished plate glass now includes any sheet of glass which has parallel plane sides, the surfaces of which are produced by mechanical means, and which do not possess the original skin left from the glass in the molten state.

The first use of polished plate glass is thought to have been for mirrors, and it was probably produced by the Venetians in the sixteenth century. Very likely, these mirrors were formed by pouring or dropping the molten glass on a flat stone or metal plate; and then, by means of hand tools, spreading it over to form a small flat sheet of glass, which, after

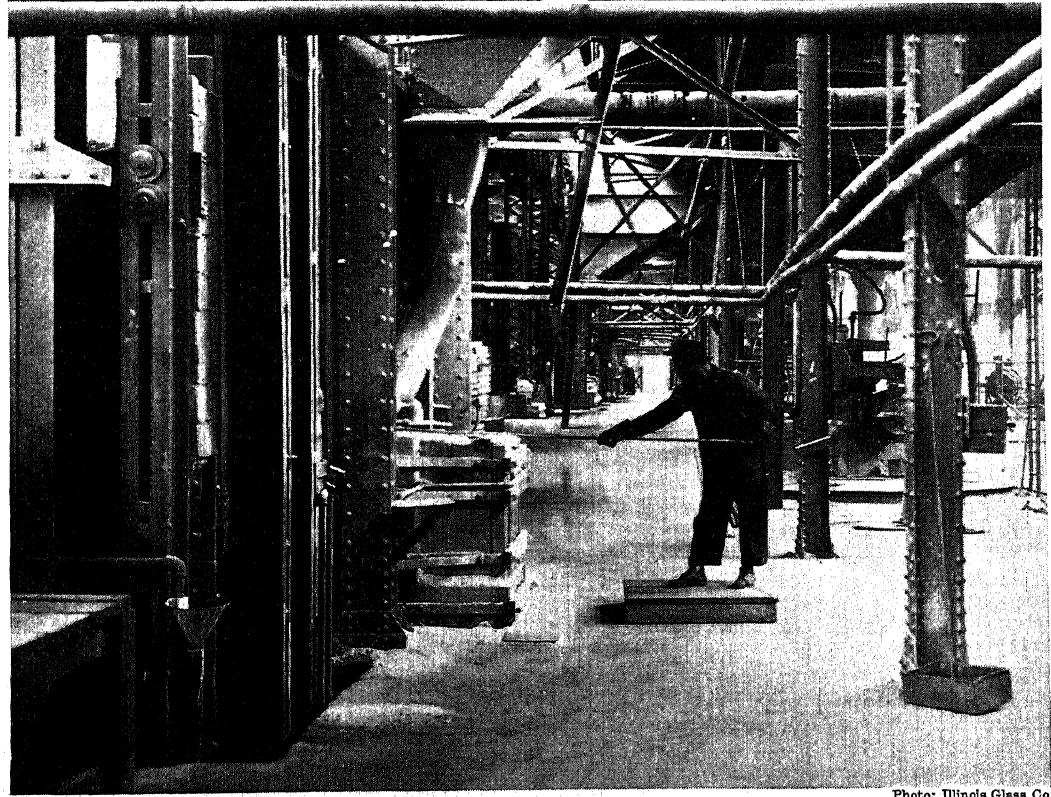
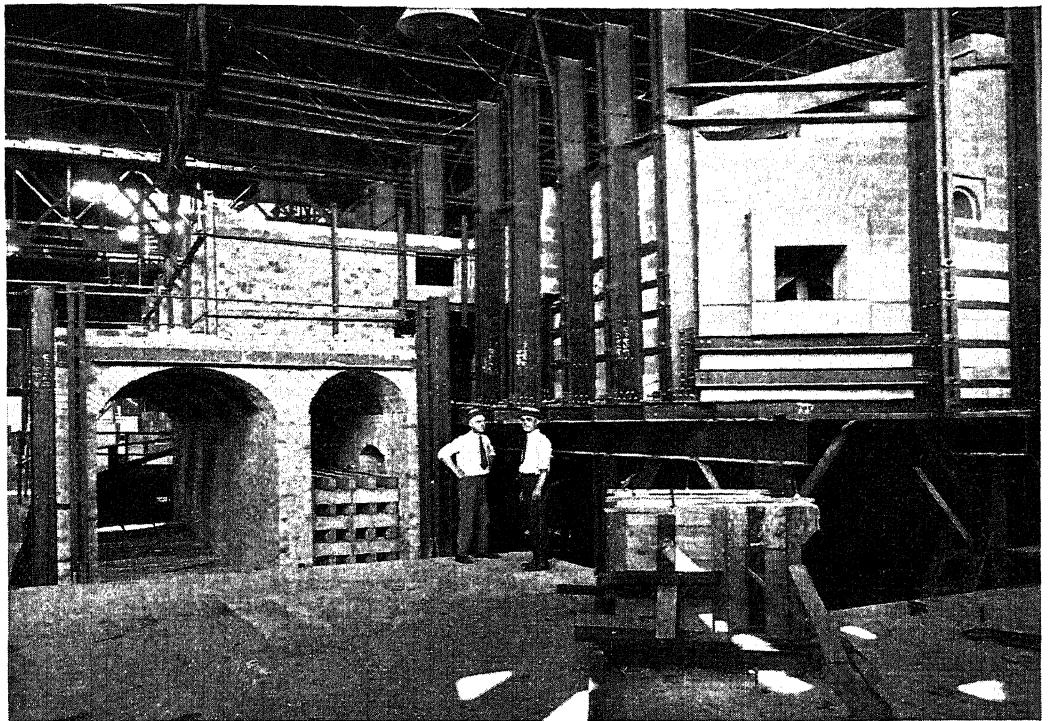


Photo: Illinois Glass Co.

Furnace Construction. The sort of melting channels in which glass is produced. Below is the rear end of a line of furnaces; into these sections the "batch" of lime, sand, and soda ash is fed.

being properly annealed and cooled, was ground and polished by hand.

This method was subsequently improved by the use of a roller as a means of distributing the glass over the platen on which it was formed; gradually the size of the operation was increased until at the present time sheets containing over 600 square feet are made by this method, requiring very large and highly organized apparatus for carrying out the process.

The quality of plate glass has steadily improved, from the beginning of its manufacture down to the present time, and the best quality, such as is used for mirrors, is a practically colorless sheet of glass with a uniform index of refraction, and having no defects such as bubbles of gas. Its surfaces are optically plane, highly polished, and free from any mechanical defects, such as scratches or small pits left on the surface by the abrasive used in smoothing.

**How It Is Made.** To produce a sheet of the quality named above, the utmost care has to be exercised in every step of its manufacture. By far the largest proportion of glass of this sort is made at the present time in the following manner:

Carefully selected materials for the batch, which consist of silica sand free from iron and other impurities, soda ash, lime, salt cake, carbon, and arsenic, are carefully weighed, thoroughly mixed, and placed in specially prepared crucibles situated in large regenerative furnaces, the sides of which are full of openings having large clay doors called *tweils*; back of these are situated the clay pots.

In these furnaces the glass is thoroughly melted and refined at a temperature of approximately 2600° F., after which the furnace and pots are allowed to cool to the casting temperature of approximately 2200° F. The pots are then taken out by huge cranes and spread on a cast-iron, water-covered table, where the glass is rolled out into a sheet (in the same manner that pie crust is rolled) by means of a cast-iron roller. This is supported at its ends on two metal strips, or *tangs*, the thickness of the desired sheet. These lie on the table, spaced a distance apart equal to the width of the desired sheet.

When the sheet has been formed in this manner, it is pushed through a series of heated ovens having perfectly flat hearths, each oven being a little cooler than the one preceding. In this manner, the sheet is allowed to come into thermal equilibrium and to cool down sufficiently to hold its shape. It is then transported through a long tunnel called a *lehr*, having a gradually decreasing temperature, by means of reciprocating bars which alternately lift the sheet from its stationary support, advance it a predetermined distance toward the cold end

of the tunnel or *lehr*, and lower it onto its stationary support again. The rods are then returned to their original position, the plates again lifted and advanced as before. In this manner, by a step-by-step motion, the plate eventually reaches the cold end of the *lehr*, where it is carefully inspected for defects; the greater defects are removed, and then it is placed in rough glass racks, ready for the finishing operations.

**Grinding and Polishing.** The rough glass is next taken from these racks and cemented by means of plaster of Paris to the tops of large circular grinding tables, which are mounted on wheels placed on tracks for convenience in handling. After the plaster of Paris has had time to set, these tables are transported on specially designed tracks and transfer cars to the grinders, where the tables are lifted and secured on the top of vertical shafts in such a manner as to cause the surface of the table to revolve in a horizontal plane when the shafts are rotated.

Above these tables are two grinding runners, which consist of revolving vertical shafts with large disks at the lower ends, to which are fastened cast-iron shoes. Abrasive is fed to the surface of the glass on the table, and the grinder runners are lowered until they come in contact with the abrasive; then the runners begin to revolve, spreading the abrasive evenly over the glass on the table.

The grinding action of the abrasive between the cast-iron shoes on the lower surface of the runners and the upper surface of the glass gradually reduces the surface of the glass to a straight plane surface. This part of the operation is known as the "facing" operation, and is done with the coarsest grades of abrasives.

After the glass has been reduced to a perfectly plane surface, the coarser abrasives are washed off and finer and finer grades are fed to the grinder, producing an increasingly finer surface, until the glass has been given a very smooth surface called, indeed, a "smooth."

The runners are then lifted, the table is transferred to a polisher, where the "smooth" left by the abrasive is removed, and the glass is polished by means of rouge (red oxide of iron). This material is held against the glass by means of felt pads, which revolve over the surface of the table in exactly the same manner as the grinding runners described above.

After this surface has been given a brilliant polish, the table is taken to the "middleyard," where the glass is lifted, the table cleaned, and the glass re-cemented, with the polished side down. The table is then taken to the grinders and the polishers, and the second side is ground and polished, as described above. The glass is then lifted from the table, thoroughly cleaned and inspected, and is ready for use.

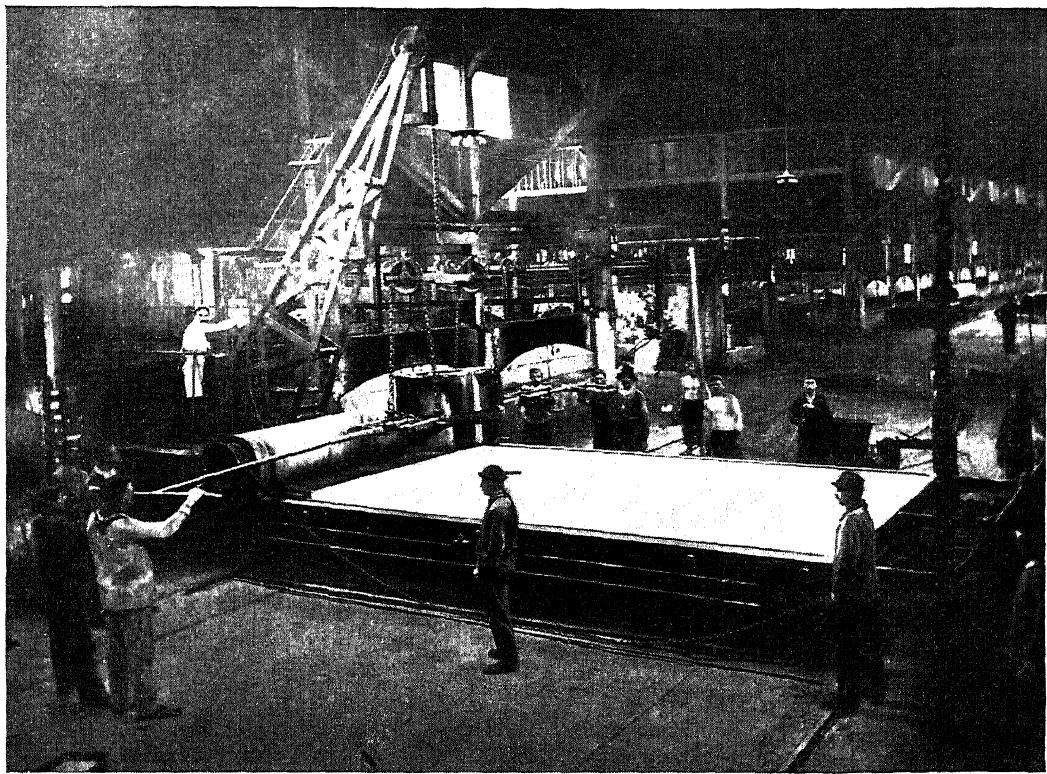


Photo: U &amp; U

## MAKING PLATE GLASS

The sheet shown above is  $8 \times 12\frac{1}{2}$  feet in size. The slightest flaw condemns the entire sheet if it is intended for a single pane.

**Improvements in Methods.** Various new methods have been perfected for simplifying the manufacture of plate glass, in which the glass itself is fused in large continuous tanks, the batch being fed into one end of these tanks and the molten material delivered at the other end.

There are numerous methods for producing the sheets of glass that are being used at the present time. In one of the most successful, the glass is forced through a die or orifice to a pair of rollers, where the surfaces of the sheet are reduced to a perfect parallelism that gives the sheet a uniform thickness. It is then transported by a series of continuously rotating rollers through a long tunnel having a gradually decreasing temperature. In this tunnel the sheet is perfectly flattened, annealed, and reduced in temperature so as to be easily handled.

This continuous ribbon of glass is then cut into standard sizes, and cemented to the top of tables which move gradually from one end of the grinding shed to the other, under a series of grinding runners which are driven by motors, the runners themselves being very similar to those previously described. The

first runner under which the glass passes is fed with coarse abrasive, which grinds off the roughness of the glass and brings it to a plane surface. It then passes under a series of grinder runners, each one using a finer and finer abrasive, until, when the sheet emerges past the end of the last grinding runner, it has a very fine surface ("smooth"), like that produced in the other type of operation. (In these volumes, see the article ABRASIVE.)

As it advances along from the last runner, the glass is cleaned, the joints are repaired, and the tables are passed under a series of motor-driven revolving polishers, where felt pads hold the rouge against the surface of the glass. When the glass emerges from the last of these polishes, it has a brilliant surface. The glass is then turned over, and the second side is given a treatment identical with the one described. The glass is then lifted, cleaned, and cut to size, as in the old process. The grinding and polishing of the sheets is substantially the same in all of these continuous processes.

P.A.H.

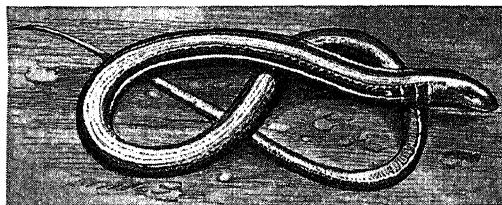
[In the United States, Pennsylvania leads in the manufacture of glass; Ohio is next, followed by West Virginia, Illinois, New Jersey, and New York.]

**Related Subjects.** The following articles in these volumes contain information more or less closely related to the general subject of glass:

|           |               |
|-----------|---------------|
| Annealing | Sand          |
| Bottle    | Stained Glass |
| Lime      | Wire Glass    |

**GLASTONBURY**, an English borough, the Avalon of Arthurian legend. Here, it was said, Joseph of Arimathea came with the Holy Grail, and founded the first Christian church in Britain. His pilgrim's staff took root on Wearyall Hill, and grew into the Holy Thorn, bursting into blossom each Christmas Eve until the Puritans cut it down. Here the Church of Peter and Paul was built in 719, and in time ruined by the Danes. Before that, it became the Abbey of Saint Dunstan (946) and the tomb of several kings, and as legend would have it, of Joseph of Arimathea and of Arthur and Guinevere. The abbey was rebuilt, but destroyed by fire in 1184. In 1303 a splendid new structure erected by Henry II was dedicated. Its ruins now are few, for it became the site of a large quarry. The principal ruin has become the property of the Church of England. See JESUS CHRIST (for mention of Joseph of Arimathea); ARTHUR, KING.

**GLASS SNAKE**, a harmless lizard occurring from North Carolina to Florida, as far west as Nebraska, and southward into Northern



GLASS SNAKE

Its average length is 27 inches; greatest diameter of body,  $\frac{3}{4}$  inch; width of head,  $\frac{5}{8}$  inch; length of head,  $1\frac{1}{4}$  inch.

Mexico. There are slight color variations in animals from different regions. The glass snake has an average length of twenty-seven inches, of which over seventeen inches make up the tail. Since the creature has no external legs, it looks more like a snake than a lizard, but its well-developed movable eyelids and lizard-like head show that it is not a serpent (see LIZARD). The glass snake is so called because its upper surface is smooth and glassy and its tail is so easily snapped off that the brittleness of glass is suggested. When pursued by a snake, this lizard, which does not move very rapidly, parts with its loosely jointed tail and makes its escape, the tail meanwhile continuing to wriggle and interest the pursuer for some time. The glass snake is a burrowing creature, feeding on earthworms, slugs, and insect larvae, and, for the most part, insects.

It also eats birds' eggs. It is one of the reptiles that have received the name *blindworm* (which see).

L.H.

**Classification.** The scientific name of the glass snake is *Ophisaurus ventralis*. It belongs to the family *Anguidae*.

**GLASSWORT.** See ALKALI.

**GLAUBER'S**, *glau' burz*, **SALT**, a chemical compound of sodium sulphate and water, which has been used as a purgative since the seventeenth century. It appears in the form of large, transparent, prismatic crystals, and has a bitter, saline taste. When exposed to air it loses its water and becomes a white powder.

Glauber's salt occurs in many mineral waters, in sea water, and also as the mineral thenardite. The laxative water called *Hunyadi Janos* contains Glauber's salt. It acts upon the intestines, liver, and pancreas, and is used in the treatment of gout, biliousness, constipation, diabetes, and similar ailments, though less commonly than epsom salt (which see). See ALBERTA (Mineral Wealth).

[Glauber's salt was named for a German chemist, Johann Rudolf Glauber (1604-1668), the first person to prepare it for medicinal use. Although a believer in the philosopher's stone, he did much to further the cause of chemistry.]

**GLAUCE**, *glaw' ke*, in Greek legend, the second wife of Jason, upon whom Medea took revenge. See JASON; MEDEA.

**GLAUCOMA**, *glaw ko' mah*. See BLINDNESS (Common Eye Diseases).

**GLAZING.** See POTTERY, subhead; ENAMEL.

**GLEANING**, the gathering of corn (a term including wheat) left by reapers in the field, regulated by the ancient law of Israel, which demanded that the gleanings of the harvest should be left for the poor and the stranger (*Leviticus* xix, 9, 10, and xxiii, 22). In England it was declared that gleaners were not trespassers. Gleaning in England, however, is now confined to the families of farm laborers.

[In these volumes, see illustration, *The Gleaners*, in the article MILLET, JEAN FRANÇOIS.]

**GLEBE.** See KITE (bird).

**GLENDALE, CALIF.** See CALIFORNIA (back of map).

**GLENDOWER, OWEN.** See WALES (History).

**GLENS FALLS, N. Y.** See NEW YORK (back of map).

**GLICK**, GEORGE WASHINGTON (1827-1911), an American statesman and lawyer, honored by the state of Kansas as its representative in Statuary Hall, Washington, D. C. The statue, the work of Charles H. Niehaus, was presented in 1914. Glick was born at Green castle, O., but his parents later moved to

Lower Sandusky (now Fremont), O., where he was educated. He studied law, was admitted to the bar in 1851, and located in Atchison, Kan., in 1859. At the outbreak of the War of Secession, he enlisted in the Union army. When the laws of Kansas were revised and codified in 1868, Glick was chairman of the committee on judiciary, and to him is given great credit for the "Revised Statutes of Kansas." He was elected governor of the state in 1882, and three years later was appointed pension agent at Topeka by President Cleveland. See STATUARY HALL.

**GLIDER.** See AIRCRAFT (Man Learns to Fly).

**GLITTERTIND.** See NORWAY (The Land).

**GLOBE.** As ordinarily understood, a globe is an object shaped like a ball. As applied to the study of geography, a globe is a hollow sphere made of metal, plaster, or pasteboard, on whose surface is shown a map of the world. It is called the *terrestrial globe*, and its purpose is to indicate the great land and water divisions, present an idea of the earth's geography as a whole, and simplify the study of the seasons and the succession of day and night by actual illustration of the manner in which the earth rotates on its axis. A similar device for studying practical astronomy, called the *celestial globe*, presents a map of the heavens.

The making of an ordinary schoolroom globe is an interesting process. Layers of paper are pasted over a spherical mold to the thickness of cardboard. The resulting shell is cut into two hemispheres, the dividing line marking the equator. The halves are then glued together around a wire representing the earth's axis, at right angles to the equator, its two ends representing the north and south poles. After the globe is covered with a variety of plaster and is made perfectly smooth and round, the map is pasted on. The flat map, such as appears in books, will not do, for the latter are plane surfaces, whereas the sphere has a curved surface. A map must therefore be specially made and printed in sections, with proper allowance for curvature. Small circles are printed for the polar regions, and a number of long strips, or gores, form the rest of the earth. As in all maps, the parallels of latitude and the meridians showing longitude are marked on the globe. See MAP.

In mounting the terrestrial globe on its stand, the axis is inclined to an angle of  $23\frac{1}{2}$ °, corresponding to the inclination of the earth's axis. Usually, a movable vertical band of brass represents the *meridian*, and is divided into degrees and minutes; a stationary horizontal band of wood represents the earth's *horizon*, and is marked with several circles showing the thirty-two points of the compass, the twelve signs of the zodiac, and the days and months of the year.

R.H.W.

**GLOBE, ARIZ.** See ARIZONA (back of map).  
**GLOBE AMARANTH.** See EVERLASTING FLOWER.

**GLOMMEN RIVER.** See NORWAY (Rivers and Lakes).

**GLOSSARY,** a dictionary of special terms, such as those used to-day in any of the sciences or arts. The term is derived from the Greek *glossa*, meaning the *tongue*. Such collections early took the name of *glossai*, and during the Alexandrian period they were common. They covered the works of Homer and other poets, and were used also by Rabbinical writers in explanation of the Hebrew sacred writings and by some of the early Church fathers who worked on the Latin Vulgate.

**GLOSSO-PHARYNGEAL NERVES.** See NERVOUS SYSTEM.

**GLOTTIS,** *glah't is.* See LARYNX.

**GLOUCESTER,** *glos' ter,* ENGLAND. See ENGLAND (The Cities).

**GLOUCESTER,** MASS. See MASSACHUSETTS (back of map).

**GLOUCESTER CITY,** N. J. See NEW JERSEY (back of map).

**GLOVE,** *gluv.* This word is derived from the Anglo-Saxon *glof*, meaning the *palm of the hand*. Gloves are made of leather—the skins of sheep, calves, lambs, kids, dogs, rats, kangaroos—and also of silk, cotton, canvas, worsted. All kinds of leather or kid for glove-making are treated differently from leathers for other purposes; the object sought in dressing and tanning the skin is to make it soft and pliable. The leather is usually cut by dies and sewn by machinery (see LEATHER). Silk, cotton, and worsted gloves are sometimes knitted, but more often are cut from pieces of woven fabric and sewn together. In the manufacture of men's gloves, the United States leads the world, but France is supreme in the production of the finer kinds of women's gloves. The name *kid*, commonly applied to gloves of soft, thin leather, does not imply that such gloves are made of kid skin. The number of kid-gloves produced annually is far in excess of the supply of any one kind of leather. The term *dogskin* is also applied to gloves made of sheepskin, and relates only to the finish of the leather. Suède gloves are made with the inside of the skin forming the outside of the glove.

The state of New York is the center of the American glove industry. Glove-makers from Connecticut were induced to settle on lands in Fulton County granted to them by Sir William Johnson in 1760. From that date, glove-making has been the principal occupation of the inhabitants of that section, and Fulton County now produces one-half the leather gloves made in the United States. One city, Gloversville, so called on account of the number of its glove-making establishments, manu-

factures one-third of the American glove output. In Canada the glove-making industry is principally divided between Ontario and Quebec, and has been little developed in Western Canada.

Among the Greeks, gloves were worn as a protection to the hands when rough work was done. The Romans used them as ornaments and as a sign of rank. In the days of chivalry, knights often wore ladies' gloves fastened to their helmets as signs of favor. Gloves were also regarded as battle gages, to be thrown down by a challenger and picked up by one accepting the invitation to fight. To shake hands while wearing a glove, and not to extend the bare hand of fellowship was in the days of knighthood regarded as an insult or challenge, signifying a desire to meet in combat. At the present day it is not regarded as correct form for a man to offer a gloved hand to be shaken; when such an act is necessary, an apology should be offered. This restriction no longer applies to women.

**GLOVED CAT.** See WILD CAT.

**GLOVER, GEORGE W.** See EDDY, MARY BAKER.

**GLOVER, JOHN** (1732-1797), an American Revolutionary soldier, one of the most prominent men of his day, but now almost forgotten. He was a cobbler in Massachusetts in 1775, but rose to the rank of brigadier general. Glover was in charge of the retreat from Long Island, was a brigade commander at White Plains, had charge of the boats by which Washington crossed the Delaware, was responsible for British prisoners on their march from Saratoga to Cambridge, was a member of the court which tried Major André, and was officer of the day when André was executed. See REVOLUTIONARY WAR IN AMERICA.

**GLOVERSVILLE, N. Y.** See NEW YORK (back of map); GLOVE.

**GLOWWORM.** See FIREFLY.

**GLOXINIA,** *glok sin' ih ah*, a popular greenhouse plant, remarkable for its richly colored, velvety leaves and large, graceful, delicately tinted flowers. A native of tropical America, the gloxinia is now widely cultivated in houses and gardens. It is a delicate plant, requiring a light soil and careful watering, but the beauty of its lovely bell-shaped flowers and soft leaves will repay any amount of thought and effort.

GLOXINIA



B.M.D.

**Scientific Name.** The gloxinia belongs to the family Gesneriaceae. Its botanical name is *Sinningia speciosa*.

**GLUCINUM.** See CHEMISTRY (Elements).

**GLUCK, gluk, ALMA** (1884- ), a concert and operatic soprano who became a general favorite with American audiences. She was born in Bucharest, Rumania, but has lived in the United States since the age of six. Most of her musical education was secured in her adopted country. In 1914 she married Efrem Zimbalist, a well-known violinist, and the two have given many successful recitals together. Madame Gluck attained immediate success in 1909, upon her appearance in New York City, with the Metropolitan Opera Company, as Sophie in *Werther*. Later, she repeated her American triumphs when she made her début in London. In addition to many appearances in concert, she has sung leading rôles in *Bohème*, *Orfeo*, *The Bartered Bride*, *Faust*, and other operas. She gave herself only one year of foreign study.

**GLUCK, CHRISTOPH WILLIBALD** (1714-1787), a German musical composer who is classed with Wagner as a reformer of opera. Gluck was born in Weidenwang, Bavaria. In his boyhood, he studied singing and instrumental music, continued his lessons at Prague, Vienna, and Milan, and in the latter city began to compose operas in the conventional Italian style. In 1745 he was invited to London to write operas for the Haymarket Theater, and while there was brought to a sense of his deficiencies by the stern criticism of Handel. Years of study followed, and though he continued to compose along the old lines, new ideas of operatic form were slowly developing in his mind.

In 1762 Gluck produced in Vienna the first of the reform operas—*Orfeo ed Euridice*. Though written to counteract the trivialities of the Italian school, this opera won favor



Photo: U & U

ALMA GLUCK



Photo: Brown Bros.

GLUCK

even in Italy. It was followed by *Alceste*, *Paris and Helen*, *Iphigénie en Aulide*, *Armide*, and *Iphigénie en Tauride*, all of which were successful. The crucial point of Gluck's career was the production of *Iphigénie en Aulide* in Paris, in 1774, for at the same time there was produced an opera of the same libretto, by Piccinni, a talented Italian composer of the old school. All Paris took sides, but the victory was with Gluck.

Gluck paved the way for the perfect music drama of Wagner. His reform consisted in making all the operatic elements—overture, choruses, dances, voice parts, and orchestrations—contribute to the dramatic situation, and in making the music a true expression of the words. See OPERA; WAGNER, WILHELM RICHARD.

**GLUCOSE**, *gloo' kose*, also called DEXTROSE and GRAPE SUGAR, is a sugar found in nature in the juice of grapes and some other sweet fruits, in many seeds, leaves, roots, and flowers, in honey, and in the bodies of man and animals. When pure, glucose is a white crystalline substance, about half as sweet as cane sugar. The digestive ferments produce it in the body by splitting up starches and more complex sugars. It does not have to be digested, but is carried by the blood to the tissues, where it is rapidly oxidized and becomes a source of heat and energy. According to recent investigation, in the intestine glucose is liberated from the cellulose of vegetable foods by the action of bacterial ferments. In this manner, cellulose becomes a source of nutriment, in the same way as starch. In healthy human blood, glucose is found in the proportion of 0.1 per cent. In the disease diabetes (which see), glucose accumulates in the blood because it is burned in the tissues in too small amounts. See BIO-CHEMISTRY (Substances in Animals and Plants).

**Commercial Glucose.** This is a syrup obtained from cornstarch. The corn is first steeped, then ground in water, and the starch, after settling, is washed and cleaned with hydrochloric acid in closed vessels called converters. The action of the acid is then neutralized by sodium carbonate, and a long process of filtration follows. The liquid becomes thick and syrupy after the final treatment, and a solidified grape sugar results if the converting process is carried still further. This is employed in brewing. Commercial glucose is widely used for mixing with other syrups, in candy-making, in the preserving of fruits, and as an ingredient in soda-fountain preparations. So-called corn syrup is a mixture of glucose and cane syrup. Glucose is also utilized in the manufacture of leather filling, soap, and tanning extracts. E.V.M'C.

**Related Subjects.** The reader is referred in these volumes to the following articles:

Carbohydrates   Corn (Products)   Sugar

**GLUE**, *gloo*. This well-known adhesive is an impure form of gelatin. Used principally to cause pieces of wood to adhere to each other, it is also employed as a sticking material for leather, paper, and various other substances, and as sizing, to give a glaze to fabrics and paper. The name is sometimes applied to adhesives that do not contain gelatin.

. Glue is derived from the hides, hoofs, horns, bones, and sinews of animals. The very best American glue is from sinews. In England bone-glue making is still important, but in America the more difficult manufacture of hide glue has largely taken its place. After a chemical process which includes boiling, a jelly is obtained, which, with further refinement and drying in rooms of carefully regulated temperature, becomes the brittle glue of commerce. This, when dissolved in hot water, gives a cement that will withstand several hundred pounds of strain. Glue heated too long, or more than once, is weakened. Marine glue contains no gelatin, is useful principally to shipbuilders, and is usually composed of India rubber, naphtha, and powdered shellac. Fish glue, largely used in bookbinding and other industries, is a glue composed chiefly, if not altogether, of isinglass, which is a form of gelatine obtained from the air bladders of fish. See ISINGLASS.

**Glue Industry.** The glue industry in America began with Peter Cooper in 1827. The annual product fluctuates in value from \$24,000,000 to \$30,000,000. The average number of factories from year to year is fifty. The tendency is for the manufacturers to concentrate near the large stockyards of the Middle West; the larger packing firms have their own factories.

**GLUTEN**, *gloo' ten*, a tough, sticky, somewhat elastic, and almost tasteless substance of a grayish-yellow color, found in wheat and other cereal grains. It is a vegetable albumin (see ALBUMEN), and its presence in cereals is important because it is the principal source of nitrogen in grain foods. Gluten consists chiefly of two proteins, glutelin and gliadin. It may be obtained from the flour of wheat by filling a muslin bag with flour and kneading it under running water. In this operation, the starch of the flour will be washed away in a milky stream, the gluten remaining in the bag as a sticky mass.

It is the gluten in flour that makes bread dough stick together, and this stickiness is utilized in the making of flour paste. Gluten bread and biscuits are prescribed for those suffering from diabetes (which see). Wheat which contains a high percentage of gluten is used in the manufacture of macaroni. On an average, there are eight pounds of gluten in one hundred pounds of wheat flour. E.V.M'C.

**Related Subjects.** The reader is referred in these volumes to the following articles:

Albumen  
Bread

Flour  
Macaroni

**GLUTTON.** See WOLVERINE.

**GLYCERIDES,** *gli's ur idz.* See FAT.

**GLYCERINE** (also spelled GLYCERIN), *gli's ur in*, a colorless, odorless, syrupy liquid of sweetish taste, employed extensively in the arts and in medicine. Glycerine is a by-product of the candle and soap industries. Its ultimate source is the fats and fatty oils found in plants and animals, such as cottonseed oil, lard, and tallow. In the manufacture of stearin for candles, fats are treated with steam at a high temperature, and usually in the presence of a relatively small quantity of some substance which will accelerate the action of steam upon the fat. (Lime and sulphuric acid are among these accelerating agents.) In soap-making, fats are boiled with alkalies. In the former industry, one pound of glycerine is produced for every nine pounds of stearin; in the latter, one pound of glycerine for about eleven pounds of dry soap. The glycerine is purified by distillation in superheated steam.

**Properties.** Chemists prefer to call pure glycerine *glycerol*; good commercial glycerine is over ninety-nine per cent pure glycerol, which is a chemical compound of carbon, hydrogen, and oxygen. At a low temperature, glycerol sometimes solidifies into crystals, melting at 63° F., but this is rare, and just what is necessary to start the crystallization is not known. Ordinarily, even the purest glycerine remains liquid, however cold it is kept. The boiling point, 552°, is very high for an organic compound. It is very hard to set glycerine on fire. It burns with a colorless flame without charring, and, if pure, leaves no ash. At the ordinary temperature, glycerine does not evaporate. On the other hand, it absorbs moisture from the air; it will take up half its own weight of water in this way.

**Uses.** Glycerine is added to many materials to prevent their drying out. Among the commodities to which it is added for this purpose are tobacco, copra (shredded coconut), confectionery, heavily starched cotton goods, and inks for rubber stamps.

Glycerine mixes with water and alcohol in all proportions, and dissolves many inorganic and organic substances. Some dyes are dissolved in glycerine and then mixed with water. Stains made on linen by coffee and tea can be removed by moistening the material with glycerine, allowing it to stand for a time, and then steaming or washing with soapy hot water. Glycerine added to water lowers its freezing point. For this reason it is sometimes used in gas meters, floating compasses, and automobile radiators. Mixed with lead oxide, it makes a good cement.

Glycerine feels oily and warm. The warmth is due to the mixing of the glycerine with water,

which it extracts from the skin. It is used in medicine to allay inflammation, thus having a soothing effect. The same *emollient* property makes it useful as a cosmetic for chapped hands and sore lips. Taken internally in very small doses, it is harmless. Larger doses have a purgative action, and very large doses may even prove fatal. Glycerine suppositories introduced into the rectum absorb water from surrounding tissues and cause quick action by this irritation. Glycerine is sometimes used as a solvent for other medicines. As a preservative, it is sometimes applied to untanned hides and to meat. The greatest industrial use of glycerine is in connection with the manufacture of the powerful explosive nitroglycerine. This is made by the action of nitric acid on glycerine, in the presence of sulphuric acid.

**Related Subjects.** The reader is referred in these volumes to the following articles:

Explosives  
Fat

Nitroglycerine  
Soap

**GLYCEROL.** See GLYCERINE, above.

**GLYCOGEN,** *gli' kojen.* See BIOCHEMISTRY (Substances in Animals and Plants); BLOOD (Circulation of the Blood); LIVER.

**GLYN,** *glin*, ELINOR, an English novelist whose works have been widely read and much discussed because of their sensational character. She is the daughter of Douglas Sutherland of Toronto. In 1892 she married Clayton Glyn, an Englishman, and until his death, in 1915, they lived chiefly in France. Mrs. Glyn spent considerable time thereafter in the moving-picture colony of California, superintending the production of her stories, which were very popular on the moving-picture screen.

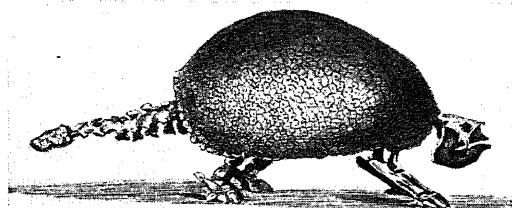
**What She Wrote.** Her early novels, of which the most noteworthy were *The Visits of Elizabeth* and *The Reflections of Ambrosine*, attracted no special attention, but *Three Weeks*, which appeared in 1907, was one of the most talked-of books of the decade. Later publications include *Elizabeth Visits America*, *The Reason Why*, *His Hour, Man and Maid*, *The Great Moment*, and *Six Days*. Most of Mrs. Glyn's works treat of sex questions in a morbid, unpleasant manner.

**GLYPTODON,** *gli'p' toh don*, a gigantic extinct mammal, which was probably ten or twelve feet in length. Its fossil remains have



ELINOR GLYN

been found in South America, and occasionally in the United States. The body had a solid armor of jointed plates without movable rings, and the head and tail were covered with similar



SKELETON OF THE GLYPTODON

plates. The legs were very strong and the feet short and broad. The character of its claws shows that the animal could not have burrowed, like the armadillo, although closely related to it.

W.N.H.

**GNAT**, *nat*, a name given various "blood-thirsty," irritating insects of the order *Diptera*, the most common being the mosquito. All gnats are two-winged; each is equipped with a long, sharp, sucking and piercing organ called a *proboscis* (which means *snout* or *trunk*). Most gnats lay their eggs on water, where they float three days and then hatch. If standing pools of water were removed, these irritating insects would be less numerous. The *buffalo gnat*, which is very annoying to domestic animals, is especially prevalent in the Southern states. In the northern woods, an almost invisible gnat called the *punky* is a most troublesome pest; it is so tiny the Indians have called it the "no-see-um." One family of gnats consists of tiny gall-making insects, of which the most injurious is the *Hessian fly* (which see).

W.J.S.

**GNEISS**, *nise*, is a rock composed of the same minerals as granite—quartz, feldspar, and mica—but its minerals, especially the mica, are arranged in layers. These layers may be straight or wavy, and of varying thickness. In some varieties, hornblende, garnet, or other minerals take the place of, or are associated with, the mica, giving rise to variations in color and texture.

Geologically, gneisses are metamorphic rocks of igneous or sedimentary origin (see METAMORPHISM). Gneiss is much used for paving blocks, and when it is not too divided on parallel planes, makes a good building stone. See GRANITE; BUILDING STONE.

A.J.

**GNOMES**, *nohmz*. In Norse mythology, fairy dwarfs, called gnomes, guarded the mines and miners. The male gnomes, who were ugly and misshapen, were condemned to live underground all their lives, for if they appeared in daylight, they were turned to stone. Under the leadership of Sindri, they mined silver, gold, and precious stones, besides serving as smiths for the gods. The women, who were very good and beautiful, were only a foot high, and were the special guardians of diamonds; occasionally, some of them would creep out to torment man, if he had been wicked.

To the old Rosicrucians, gnomes were subterranean beings who guarded mines and the treasures within the earth. English miners called them *knockers*, as these workmen sometimes fancied they heard unseen beings knocking in the bowels of the earth. Among the gypsies, gnomes were always evil spirits, with power to take possession of unbaptized children. Certain gypsy tribes believed the gnomes were the progenitors of a real race of people, which may have given rise to the stories about them.

**In Literature.** Pope refers to the fabled gnomes in his *Rape of the Lock*, as in the following quotation:

Swift on his sooty pinions flits the gnome  
And in a vapour reached the dismal dome.

**GNOMON**, *no' mon*. See SUNDIAL.

**GNOSTICS**, a name given to a number of sects during the first six centuries of Christianity. They were knowers, or rationalizers, rather than mere believers. They attempted to harmonize the teachings of Christianity with the speculations of the Greek and Oriental philosophers. Like many of our modern scientists, they believed that knowledge rather than blind faith is the key to life's mysteries and the apparently unknowable. While they attempted to graft many of the ancient mysteries upon Christianity, and while they caused much unrest and disquietude, they were the first to set the writings of the Apostles side by side with the Gospel histories as of equal Scriptural importance. They were arbitrary in their interpretations. Gnosticism refers to the beliefs and the body of knowledge represented by the gnostics.

**GNU**, *nu*, a South African antelope, resembling in form the horse, the buffalo, and the antelope. Both sexes have horns, which in all animals is not true. There are two principal species



THE GNU

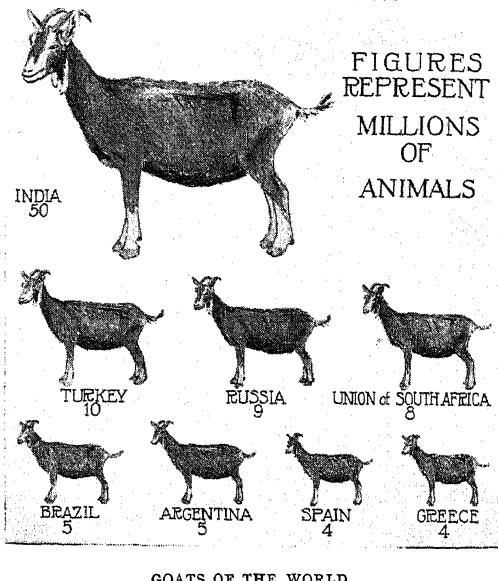
Photo: Visual Education Service

—the *common*, or *white-tailed*, now practically extinct, and the *brindled gnu*, still to be found in the interior of Africa. Gnus formerly traveled in herds of thirty or forty, and apparently were friendly with zebras and quaggas. In common with the buffalo and the bull, they are angered by the sight of scarlet. Their flesh is said to be palatable and nourishing. They are occasionally seen in "zoos." See ANTELOPE.

W.N.H.

**Scientific Names.** Gnus belong to the family *Bovidae* and the genus *Connochaetes*. The white-tailed is *C. gnu*; the brindled, *C. taurinus*.

**GOAT.** Humorously called "the poor man's cow," the goat is a member of the sheep family. It is a hardy animal and furnishes sweet,



GOATS OF THE WORLD

nourishing, health-giving milk, edible flesh, and a very useful hide. Though they are not quite the size of sheep, goats are stronger and less timid, and they move more quickly. They differ from sheep in that their hollow horns are erect and turned backward, their tails are shorter, and the male is generally bearded under the chin and has a peculiar odor. The male goat is sometimes called *billy goat*; the female, *nanny goat*. The technical name for the mature male is *buck*; for the female, *doe*; for the young under one year, *kid*. Wild goats live in mountains and rocky places.

**Domestic Goats.** These are thought to have originated from the wild Persian species, and are found all over the world, great herds being kept in many parts of Europe, Asia, and Africa. They are often trained to be pets, and are harnessed to carts and driven by children. In many places they are used as beasts of burden. Goat's milk nourishes more people, probably,

than does cow's milk, throughout the world; those who become accustomed to the former will not, of choice, use the latter. For this reason, when natives of North Africa responded to France's call for soldiers in 1914 in the World War, it was necessary to maintain herds of goats near the fighting lines to furnish milk for them. High-grade leather is made from skins of goats; the famous morocco is a goatskin product.

Of the domestic breeds valued chiefly for their hair, the Angoras are the most important commercially. Their native home is Asia Minor and their ancestry goes back to the time of Abraham. This spiral-horned variety produces the beautiful, lustrous mohair used so widely in the manufacture of robes, capes, suitings, railway pluses, upholstery, and so on. Angoras are of limited distribution because of restrictions on their exportation, but their production has been established in the United States, and considerable numbers are found in Texas, New Mexico, Arizona, Oregon, Washington, California, and the Ozark region. On rough range land, Angoras are valuable as grazers of brush, and their flesh has a more agreeable flavor than that of any other kind of goat. The white, silky fleece hangs down in curly locks all over the body, and grows from eight to ten inches a year.

Another valuable hair-producing goat is the cashmere of India, from whose fleece are made the famous cashmere shawls. This variety has not been successfully introduced into the United States.

The milk-producing breeds include the New Mexican, Nubian, Saanen, and Toggenburg. The New Mexican is kept chiefly by people of Spanish blood in the Southwestern states. The Nubian is from Northern Africa, and the other two breeds are from Switzerland. There are several herds of Toggenburgs in the United States, and a few Nubians and Saanens are also found.

W.N.H.

**Classification.** Goats belong to the family *Bovidae* and the genus *Capra*. The chamois and Rocky Mountain white goat are intermediate between true goats and antelopes.

**Related Subjects.** The reader is referred in these volumes to the following articles:

Angora  
Cashmere Goat  
Ibex

Leather  
Mohair  
Sheep

**GOAT ISLAND.** See NIAGARA FALLS.

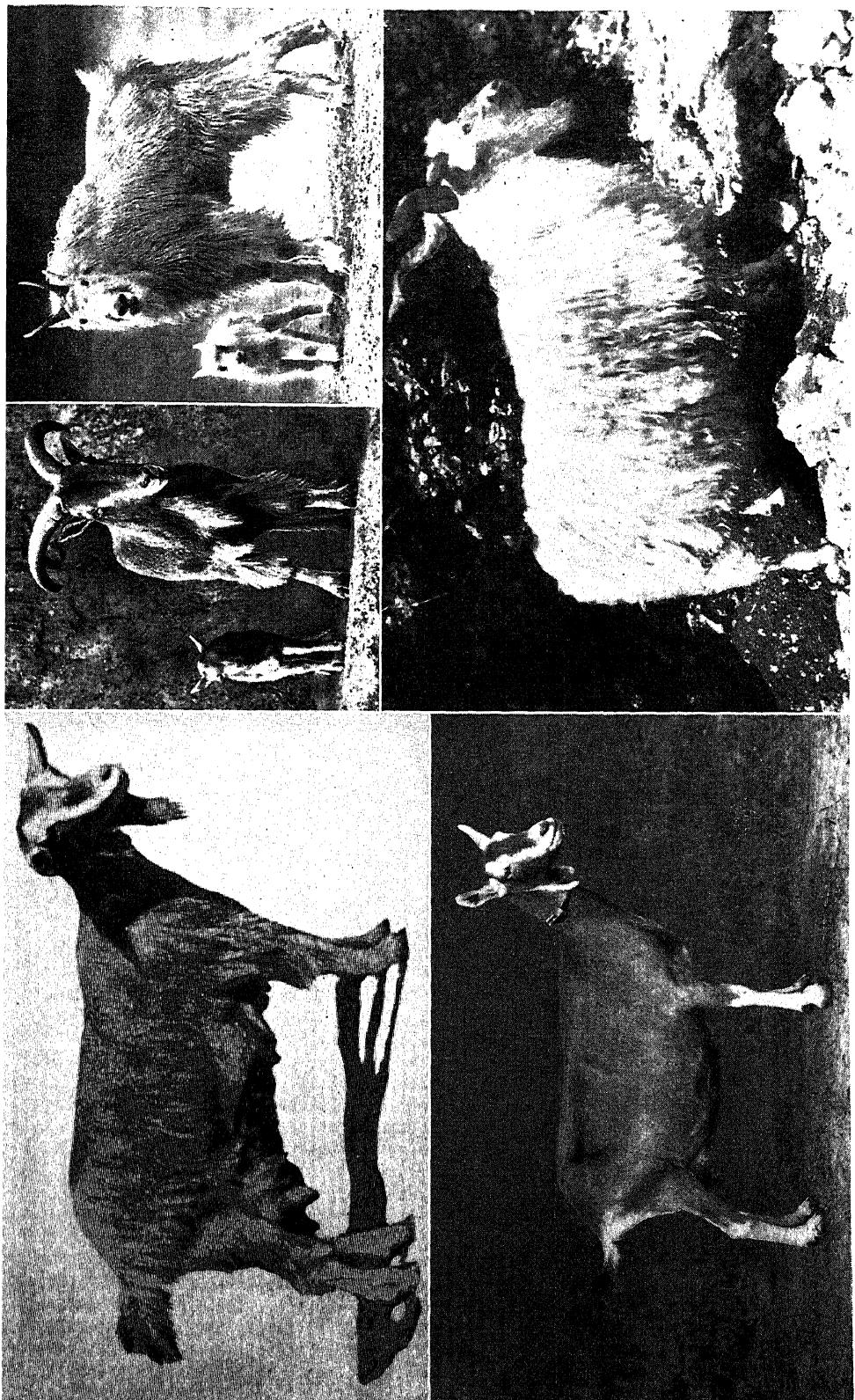
**GOATSUCKER**, a common name for a family of moth-catching, owl-like birds, the *nightjars*. The first name was given from an incorrect ancient belief that these birds milk goats. The idea probably arose because they look for insects at twilight, searching near the ground and in pastures where domestic animals graze. The more appropriate name, nightjar, was derived from their night-flying habits and jarring cries.

Photos: U & U, F & A

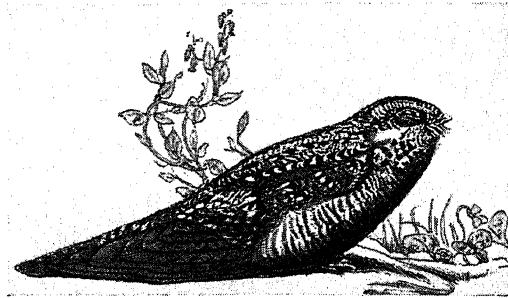
Some of the Goats. Top row: California Gretel; Mountain goat and kid; European species, photographed in the London Zoo; Rocky Mountain goat and kid, in

2840

179



Nightjars vary in size from eight to fifteen inches, and the soft plumage is in all shades of gray and brown, mottled with white. Members of this family are found almost everywhere, but are most numerous in the tropics. Representatives in America are the nighthawk and whip-poor-will (both of which see). Other



GOATSUCKER, OR NIGHTJAR

general characteristics of the family are the short, thick head, large, gaping mouth, and very small bill with bristles at the base. These birds catch their food while flying on wings which, considering the size of the bird, are long and powerful. They sleep throughout the brightest hours of the day, resting lengthwise on their perches or on their nests on the ground.

D.L.

**Scientific Name.** The scientific name of the goat-sucker family is *Caprimulgidae*. The common nightjar of the Old World is *Caprimulgus europalus*.

**GOBBO.** See OKRA.

**GOBELINS**, *go be lanz'*, a French family of dyers, established in the fifteenth century in Paris. In the sixteenth century, they added a tapestry department to their dyeworks. Colbert, minister to Louis XIV, in 1662 bought the establishment as a royal upholstery, since which time the industry has been conducted under the auspices of the state. Dyeing was discontinued by the establishment in 1662. France now maintains another manufactory for the fabrication of the famous tapestries which have taken the family name of Gobelins; this is at Beauvais. Tapestry manufacture is very similar to the making of Oriental rugs.

**GOBI**, *go' be*, DESERT OF, a dreary, treeless plateau rising 3,000 feet above sea level, in the central part of Mongolia, in Northern China. It has only a few permanent settlements, but irrigation works are bringing about an increase of population. Over its sandy waste, which covers nearly 300,000 square miles, an area twice as large as Montana, are scattered many rocky table-lands and mountains, but in the summer a scanty rainfall makes enough pastureage for the flocks and herds of the wandering tribes. During the rest of the year, the climate is very severe, especially along the borders.

Caravan and motor routes (the latter in the summer only) lead across this region from China proper to Siberia. Several explorers, especially Przhevalski and Sven Hedin, have obtained much valuable information concerning the Gobi, and the scientist Roy Chapman Andrews, within recent years, has found many archaeological records which point to a very ancient civilization there. See DESERT; NOMAD LIFE; ARCHAEOLOGY.

**GOD**, a name given, in its broadest sense, to any superhuman being who directs the activities of various races of the world. As used by Christian peoples, the term applies to only one Being, and in this sense the plural form *gods* is an impossibility. This article will consider both uses of the term.

**The Heathen Gods.** Every people, however barbarous, however little removed, apparently, from the brutes, seems to have some sort of an inborn idea of a being more powerful than man. Strangely enough—or so it seems to those acquainted with the Christian idea of God—this more powerful being is not necessarily *better* than man. The Greeks were a beauty-loving, virtue-loving people, and the myths they wove about their gods were in many instances exquisite; but fully as often these myths showed the gods to be cruel, vengeful, or immoral (see MYTHOLOGY). Such tales do not seem to have shaken the faith or allegiance of the worshipers. What wonder, then, since the Greeks, on their high plane of civilization, could invent for themselves such faulty deities, that the savage tribes often set up, as objects of their worship, beings which seem like devils rather than like gods? Some of these have not one redeeming virtue, but they are strong and very jealous, and the poor, frightened savages dare not falter in their worship, for fear of dire punishment.

**The Hebrew Idea of God.** Most of the ancient peoples, like many of the modern races whom Christianity has not touched, believed in large numbers of gods. One had the sun as his especial charge; one the moon; one presided over birth, and another over death. Each tribe, too, had its own gods, and when one tribe conquered another, it was looked upon as proof that the gods of the conquerors were stronger than those of the vanquished. In the early history of the Hebrews, they, too, looked upon their God as just a tribal deity who had no concern with the welfare of any people but the Hebrews, and who cared more for formal rites of worship than for any moral purity. Gradually the conception broadened, until God became the strong moral force in the national life and was looked upon as controlling other nations as well as Israel. It was still believed, however, that He governed the world only for Israel's good, and it was not until after the beginning of the Christian Era

that a few enlightened men began to spread the idea that God was no respecter of nations, but was a loving father, caring for all peoples alike.

**The Christian Idea.** This universal character of God is one of the central ideas in the Christian conception. That He is a personality and not a mere force; that He is eternal, all-wise, all-powerful, and all-loving; and that men may have a spiritual communication with Him—these are the chief qualities of the God of the Christians.

The discussion so far has touched merely upon various *conceptions* of God, but has said nothing as to His actual *existence*. Learned men from the beginning of the Christian Era have busied themselves over the question of the existence of God, and have brought forth various so-called proofs; but after all, it is a matter incapable of the sort of proofs of which material facts admit. Theologians argue that it is evident in every phase of life that back of the universe there is a supreme *plan*, which must have been formed by a rational Being; that man himself, with his moral nature, implies a moral personality above him; and that it is incredible that this very highest conception of which man is capable—the conception which has led him to his greatest efforts and his finest achievements—should be but a figment of his own imagination. They also point out, as proof of the existence of God, the fact of design in nature; that is, the adaptation of all forms of life to their environment. Finally, the Christian holds fast to the revelation of God as given by Christ in the New Testament—a revelation which admits of no doubt.

These, briefly stated, are the chief arguments for the existence of God, but to them the atheist objects that they are not tangible proofs. And indeed, in the last instance, every man can but fall back on his own inner conviction, and on the generally admitted truth that a God who could be completely comprehended by a finite mind would really not be a God at all.

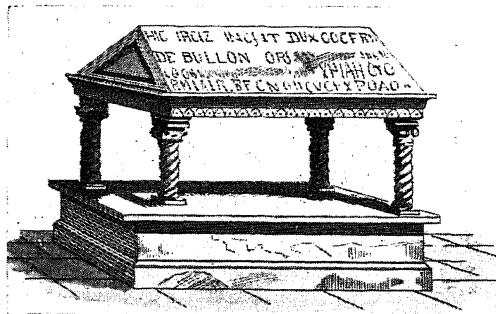
**Related Subjects.** The reader is referred in these volumes to the following articles:

|          |              |              |
|----------|--------------|--------------|
| Agnostic | Bible        | Jesus Christ |
| Atheism  | Christianity | Religion     |

**GODFREY DE BOUILLON**, *de boo yawn'* (about 1060-1100), Duke of Lorraine, was one of the foremost leaders of the First Crusade. After the conquest of Jerusalem, a Christian kingdom was founded, of which Godfrey was unanimously elected sovereign. However, he refused the kingly title and assumed the humbler one of Baron and Defender of the Holy Sepulcher. During the single year of his rule, he was successful in repelling the Egyptian attack at Ascalon, and with the assistance of

others of the pilgrims, he drew up from the various feudal statutes of Europe an elaborate medieval code of laws known as the *Assizes of Jerusalem*.

During one of his expeditions into the territory of the Moslems, he was visited by several emirs, who expressed surprise at seeing their conqueror without a guard, in a common tent



HIS TOMB

It is in Jerusalem, and dates from about the year 1150.

which boasted only of a small, rough bed, such as was allotted to the humblest soldier in his train. Such was his simple mode of life. The minstrels sang of his valor, and the fairest ladies of his land wrought with loving fingers the devices upon his banner. He died at the age of forty, but in his short life he won a name as one of the foremost representatives of the chivalry of his age. See CRUSADES.

**GODHAVEN.** See GREENLAND (Government).

**GODIVA**, *go di' vah*, LADY. According to legend, Earl Leofric, lord of Coventry, was a stern and harsh feudal baron, who taxed the citizens of the town to the utmost. Lady Godiva, his wife, seeking to help the people, begged her husband to ease their burdens. "Ride naked through the town," said the Earl, "and I will grant your request." Lady Godiva issued a proclamation requesting everyone in the city to remain within doors on a certain day, and not even to look from their houses. Clothed only in her long hair, she mounted a white horse and rode through the streets. Legend further states that the only one who tried to see her was a tailor, who peeped through a hole in a shutter, and was immediately struck blind. This episode is the origin of the "Peeping Tom" tradition. Earl Leofric was true to his promise, and gave great concessions to the townspeople. For centuries a fair was held at intervals to celebrate Godiva's heroism.

**GODOWSKI**, *go dov' skie* (1870- ), a pianist, born in Poland, is as well known in America as in Europe. At one time in the course of his musical education, he was a pupil of Saint Saëns in Paris. Godowski's first American tour covered the years 1884-1885;

the second began in 1892, and since then his visits have been numerous. For five years from 1895, he was director of the pianoforte department of the Chicago Conservatory of Music. In 1909 he settled permanently in Vienna.

Critics declare Godowski's technique to be dazzling, but that he lacks poetic conception and the quality which may be termed soulfulness.

**GODPARENTS.** See BAPTISM, subhead.

**GOD SAVE THE KING**, the national song of Great Britain, is a prayer for the glory and happiness of the sovereign. The origin of the melody is obscure. It is variously attributed to John Bull, Lulli, and Haydn, although Henry Carey (a musician and poet born in London about 1696) is generally accredited as the author of both the words and the music. The song has spread across to the Continent in more or less altered form; in fact, Germany and Switzerland each claim it. The music was formerly used by Russia for its national air, while in the United States one of the most popular of patriotic songs, *My Country 'Tis of Thee*, which has become in effect a national hymn, is sung to it. The first stanza of the English song follows:

God save our gracious King,  
Long live our noble King,  
God save the King!  
Send him victorious,  
Happy and glorious,  
Long to reign over us,  
God save the King!

**GODS OF GREECE AND ROME.** The gods of Greece and Rome were divided into two classes, *Dii Majores*, the greater, twelve in number, and *Dii Minores*, the lesser. They are listed as follows, with their supposed field of activity:

| ROMAN                      | GREEK      |
|----------------------------|------------|
| Jupiter.....King           | Zeus       |
| Mars.....War               | Ares       |
| Apollo.....The Sun         | Apollo     |
| Neptune.....The Ocean      | Poseidon   |
| Mercury.....Messenger      | Hermes     |
| Vulcan.....Smith           | Hephaistos |
| Juno.....Queen             | Hera       |
| Ceres.....Agriculture      | Demeter    |
| Diana.....Moon and hunting | Artemis    |
| Venus.....Love and beauty  | Aphrodite  |
| Vesta.....Home life        | Hestia     |
| Minerva.....Wisdom         | Athena     |

Although there were thirty thousand gods in the time of Hesiod, for fear of omitting any of them, the Greeks observed a "Festival to the Unknown Gods." (See *Acts XVII*, 17.) Four other deities were mentioned by both peoples:

| ROMAN                 | GREEK    |
|-----------------------|----------|
| Bacchus.....Wine      | Dionysos |
| Cupid.....Love        | Eros     |
| Pluto.....The Inferno | Pluton   |
| Saturn.....Time       | Kronos   |

**Related Subjects.** The reader is referred in these volumes to the leading gods and goddesses, in their alphabetical places. See, also, MYTHOLOGY.

**GODTHAAB, go' tahb.** See GREENLAND (Government).

**GODWIN, MARY WOLLSTONECRAFT** (1759-1797), the first martyr in the cause of woman's rights. She was born at Hoxton, England, and became a translator for an English publisher, in 1788, after publication of her first work, *Thoughts on the Education of Daughters*. She was in close touch with the prominent men of the day, including such reformers as Thomas Paine. In 1792 she published *Vindication of the Rights of Woman*, which brought her fame and much condemnation. She never completed a work on the French Revolution, on which she spent much time. She was very unfortunate in her love affairs, openly defying public opinion and the conventions; the first, and to her, a disastrous, love was her affection for Fuseli, an artist, whom she left. In April, 1794, she bore a daughter to Captain Gilbert Imlay, and when deserted by him, attempted suicide. In 1797 she married William Godwin, and her daughter Mary later became the second wife of the poet Shelley. See SHELLEY, PERCY BYSSHE.

**GODWINE, EARL.** See EDWARD THE CONFESSOR.

**GOETHALS, go' thalz,** GEORGE WASHINGTON (1858-1928), an American civil and military engineer, under whose efficient administration one of the most important projects of modern times, the Panama Canal, was brought to completion. He was born in Brooklyn, N. Y., and was educated at the College of the City of New York and at the United States Military Academy at West Point. On his graduation from the latter institution, in 1880, he was appointed second lieutenant in the corps of engineers, and rose steadily in rank until he reached the grade of major general, in March, 1915.

Goethals was an instructor in civil and military engineering at West Point from 1885 to 1887, and he had charge of the construction of the Muscle Shoals locks and dams on the Tennessee River, completed in 1889.

During the Spanish-American War (1898) he was lieutenant colonel and chief of



Photo: Brown Bros.

GEORGE W. GOETHALS  
Resourceful engineer, organizer, and leader of men, whose lasting glory was connected with the building of the Panama Canal.

engineers of United States Volunteers; later, he was appointed to the board of fortifications in connection with the coast and harbor defense service.

In 1907 President Roosevelt brought him into national prominence by making him chairman, as well as chief engineer, of a commission to complete the Panama Canal. His management of the great enterprise, with its many problems and difficulties, including those of sanitation (see GORGAS, WILLIAM CRAWFORD), housing, and food, and the social organization of the Canal Zone, was a striking illustration of what may be accomplished by a forceful personality, coupled with initiative and executive ability. Though the work was scheduled to be completed on June 1, 1915, a vessel passed through the canal on August 15, 1914. During 1914 and 1916 Goethals was governor of the Canal Zone.

In October, 1916, he was appointed chairman of a committee to investigate the operation of the Adamson Railroad Law, which had raised the wages of employees. In April, 1917, after accepting an invitation to construct a highway system for New Jersey, he was recalled to the Federal service to build a vast merchant marine for the United States as part of the plan of war against Germany. Because of friction he resigned, and was made acting chief quartermaster of the American army. In 1919 he retired to private life. See PANAMA CANAL (How the Canal was Built).

**GOETHE**, *gö' ta*, JOHANN WOLFGANG VON (1749-1832). This German poet, novelist, dramatist, and philosopher is not only the most eminent figure in German literature, but one of the greatest geniuses the world has ever produced. Like Socrates, the Athenian, Shakespeare, the Englishman, and Dante, the Italian, he was endowed with genius of the universal order.

Goethe was born at Frankfort-on-the-Main on August 28, 1749. His early education was directed by his father and by private tutors, and at the age of sixteen he was sent to Leipzig to study law; there he varied the routine of school work by writing lyrics and studying art. After an illness which compelled him to return to Frankfort, he resumed his law studies at the University of Strassburg, and in 1771 received his degree. During his sojourn in Strassburg, he formed a momentous friendship with the poet Johann Herder, who opened up to him the beauties of Shakespeare's writings, and taught him to love the old folk songs. Goethe's poems written at this time mark the beginning of a new era in German lyric poetry (see GERMAN LITERATURE).

Between 1771 and 1775, a period in which he occupied himself as a lawyer at Frankfort and at Wetzlar, he wrote his first important drama, *Götz von Berlichingen*, and a novel, *The Sor-*

*rows of Werther*, the latter of which has immortalized one of his unhappy love affairs. In 1775 he was invited by Charles Augustus, the young Prince of Weimar, to become a member of his court at the capital of Saxony, and for the next ten years he was deeply occupied with affairs of state, devoting himself to agriculture, horticulture, geology, and mineralogy,



Photo: Brown Bros.

GOETHE

and proving himself an able and conscientious minister whose grasp of practical affairs was astonishing. It was through this work that he came to love the study of natural science, to which he gave much attention during the last years of his life.

The period from 1786 to 1788 was spent in Italy. Coming there under the influence of classic art and literature, Goethe's own art became calmer and freer, and the unfinished dramas which he brought with him to Italy—*Iphigenie*, *Tasso*, *Egmont*, and *Faust*—begun when he was under the spell of the Romantic movement (see ROMANTICISM), were completed in an entirely different spirit. Several unfruitful years followed his return to Weimar, where, in 1791, he was appointed director of the ducal theater. This post he held for twenty-six years. In 1794 there came a new influence into his life, the friendship of the poet Schiller. Stimulated by the latter's enthusiasm for literature, he completed in 1796 his most significant novel, *The Apprenticeship of Wilhelm Meister*, a story of theatrical life which contains one of his most charming lyrics,

*Kennst du das Land.* The English translation of this beautiful song is familiar:

Know'st thou the land where the fair citron blows,  
Where the bright orange midst the foliage glows,  
Where soft winds greet us from azure skies,  
Where silent myrtles, stately laurels rise,  
Know'st thou it well?

"Tis there, 'tis there,  
That I with thee, beloved one, would repair.

The next year Goethe published his epic of humble peasant life, *Hermann and Dorothea*. Several exquisite ballads followed, and in 1808, with the publication of the first part of *Faust*, he entered upon the final period of his literary career. These last years in Weimar saw the completion of a novel, *Elective Affinities*; his autobiography, *Truth and Fiction Relating to My Life*; a sequel to *Wilhelm Meister*; a collection of Oriental lyrics; and the second part of *Faust*. As he laid aside this monumental work, the year before his death, he said, "It is now really indifferent what I do, or if I do anything at all."

Goethe died on March 22, 1832, and was buried in the ducal mausoleum, near the resting place of his friend and patron, Charles Augustus. The house in Weimar which was his home for so many years, and the one in Frankfort where he was born, are preserved as memorials of him, and many of the important cities of Europe and the United States have erected statues in his honor.

**Estimate of His Work.** Goethe was responsive to all the feelings and experiences that are common to humanity. He was distinguished for scientific attainments, for literary and artistic criticism, as a writer of fiction, and as a dramatist, yet he made his happiest contributions to his country's literature in the field of lyric poetry. From his pen also came one of the most splendid achievements of his age, *Faust*, the greatest drama of the German people. Goethe's *Faust* is more than a poetic and dramatic treatment of the old legend—the story of a weary scholar who sells himself to the Devil that he may taste the joys of youth and love (see FAUST). In it the reader will find a summary of the poet's own experience, and the expression of his philosophy of life. In the second part, the drama becomes an allegory of human character and experience; it pictures a Faust who finds salvation in useful labor and who finally triumphs gloriously over the powers of darkness. This was the poet's "confession" of what life had taught him.

**GOG AND MAGOG**, Hebrew names of Biblical characters, mentioned in *Revelation* as representing all future enemies of the kingdom of God. There is some confusion in the references in the Bible as to whether they are two different persons, or whether Gog is the man and Magog the land. However, in *Genesis* x, 2, Magog is mentioned as the son of Japheth, and in *I Chronicles*, v, 4, Gog is said to be the son of Joel.

Gog and Magog are also names given two wooden statues of giants standing in Guild-

hall, London, and an interesting legend, quite independent of Biblical reference, has developed to account for them. They are said to have been the last of a race of giants descended from the notorious daughters of Diocletian. The rest of their tribe were killed, but Gog and Magog were brought captives to London and made to serve as porters. Similar effigies have been known in England since the time of Henry V, though the date of the legend is unknown. The Great Fire destroyed the original statues, but they were replaced by popular subscription in 1708.

**GOGOL**, *gaw' gole' y*, NIKOLAI VASILEVICH (1809-1852), a Russian humorist and novelist, was born in the Ukraine. In 1828 he went to Saint Petersburg (now Leningrad), where, homesick for his beloved "Little Russia," he wrote short stories full of the color, laughter, and life of his people. Recognition soon came to the lonely youth. He met Pushkin, Russia's greatest poet, and, finding in friendship the stimulation he needed, wrote his great romance, *Taras Bulba*, an epic of the fifteenth-century Cossacks.

Next followed a comedy, *The Inspector General*, exposing and ridiculing the provincial officials. Fearing the play would be censored, Gogol's friend took it to Nicholas I, whom it greatly amused, and he ordered it produced immediately.

*Dead Souls*, published in 1842, is the first of the realistic Russian novels, although some critics say Gogol's realism is too grotesque and satirical to be true to life. His satire was used to awaken people to evil conditions; his grotesque characters were drawn with tears underlying his laughter. *Dead Souls* was considered so dangerous it was not reprinted for years, for although Gogol never expressed personal opinion, his novel was a vivid indictment of serfdom. When Pushkin read it, he exclaimed, "What a sad country is Russia! Gogol invents nothing: it is the truth, the terrible truth." During his last years, Gogol lived abroad, ill and depressed. In a religious frenzy he burned many of his manuscripts, including the second part of *Dead Souls*, which was never completed. His life and his work are summed up in the old Russian saying carved on his tomb, "And I shall laugh with a bitter laugh."

**His Principal Works.** These are *Evenings on a Farm near Dikanka*, Ukrainian stories, *Taras Bulba*, *The Inspector General*, the only internationally known Russian play, and *Dead Souls*. *The Cloak* is his best-known short story.

**GOING-TO-THE-SUN MOUNTAIN.** See GLACIER NATIONAL PARK.

**GOITER**, *goi' tur*, an enlarged thyroid, one of the ductless glands. It is located toward the front of the neck, between the Adam's apple

and the top of the breastbone. The secretion of this important gland has much to do with the rate of growth of children, and with the metabolism rate of both grown people and children. (Metabolism represents the chemical changes in living cells by which energy is provided for vital processes.) A person with a high metabolism is energetic, mentally alert, and active physically; one with a low metabolism rate is the reverse. In addition, the secretion of the thyroid has an effect on the respiration and pulse rate, and on some of the other ductless glands.

**Prevalence.** Goiter is more liable to develop in women than in men, and in older children than in adults. In certain countries and parts of countries, it is very prevalent. Among such areas are certain valleys in Switzerland, and the goiter belts of the United States. The great American goiter belt centers around the Great Lakes and along the Rocky Mountains. On the other hand, there is very little goiter along the seaboards and throughout the far South. Studies have shown that away from the ocean, wherever the drinking water contains iodine, there is little goiter, and vice versa.

**Causes.** Among the causes of goiter are diets that include drinking-water poor in iodine; very rapid growth; pregnancy; and great emotional strain. Drinking badly polluted water is sometimes a cause, in the opinion of some authorities.

**Varieties.** There are several varieties of goiter. *Anatomical* goiter is the form generally encountered in rapidly growing older children. It frequently returns to normal soon after growth ceases. *Toxic* goiter is the variety which is accompanied by nervousness, rapid, irritable pulse, shallow breathing, and loss of weight. *Exophthalmic* goiter is the variety in which, in addition to "big neck," there is protrusion of the eyeballs. *Cancerous* goiter is the malignant variety. *Hidden* goiter, or *inward* goiter, is the variety in which the enlarged mass is behind the breastbone and is not seen in the neck.

*Myxoedema* is a condition the opposite of goiter. It develops in grown persons, and is characterized by slowness of mind and body, thickness of speech, low metabolism, and thickening of the skin. *Cretinism*, also the opposite of goiter, is a disease of childhood corresponding to myxoedema of adults.

**Prevention.** Goiter is prevented by the inclusion of sea food in the diet; the eating of table salt that contains iodine; the drinking of water that contains iodine; or the taking of some form of iodine. The amount used must be very small. Living hygienically, especially during pregnancy and during later childhood, is of service.

**Treatment.** Surgical operation is frequently necessary. Treatment with X-rays and other

light is used. In the treatment of myxoedema and cretinism, use is made of some extract of thyroid or of thyroxin, an iodine preparation extracted from the thyroid. See *IODINE*; *GLANDS* (Ductless Glands).

W.A.E.

**GOKCHA, guk chah', LAKE.** See *ARMENIA*.

**GOLAN**, one of the Cities of Refuge (which see).

**GOLCONDA, gol kon' dah**, the ancient city of India which lay halfway between Madras and Bombay. It was famous in olden times for diamonds, which, however, were merely cut and polished there. The expression *richer than Golconda* became proverbial. The ruins of this city of the long ago are still famous for the ancient fortress, now used as a state prison, and for the gray-stone burial places of one-time rulers of the ancient kingdom of Golconda.

**GOLD.** So far as we know, there has never been a time when this yellow metal has not been "the precious metal," more sought after than any other. All researches show that man knew of it before he knew of any other metal, and that it was everywhere, in a sense, the standard of value. The Assyrians and the Egyptians, the founders of the very oldest civilizations, expended their skill in fashioning ornaments from it; and what the ancient Hebrews thought of it is shown by the fact that it seemed the only thing with which they could compare those "precepts of the Lord" which were the greatest factor in their national life. "More to be desired are they than gold," chanted the Psalmist; "yea, than much fine gold." Some of the Oriental peoples almost worshiped it, for was it not in its color and luster like the sun, the god of their idolatry?

In medieval times, it played a great part in history, for a whole science was built around it—the science of *alchemy*. Gold was the most perfect substance in the world, the alchemists declared, and they used their science and their magic in vain attempts to find some means of turning other metals into it. With the growth of science and the understanding of the principles of chemical elements, it became clear that such transformation could not be brought about. The knowledge of the properties of gold acquired by the alchemists in their vain search has served as a basis for a more scientific study of this very interesting metal.

**Its Properties.** First of all, it is a chemical element; that is, it cannot by any known means be separated into simpler components. It is a bright-yellow, lustrous, very heavy metal (19.31 times heavier than water), and it melts at a temperature of about 1945° F. If subjected to a much higher temperature, it gives off a vapor with a greenish-yellow color. It has been estimated that the boiling point would be 4585° F. Electricity and heat both pass through it readily; in other words, it is a good conductor, but, needless to say, it is seldom put

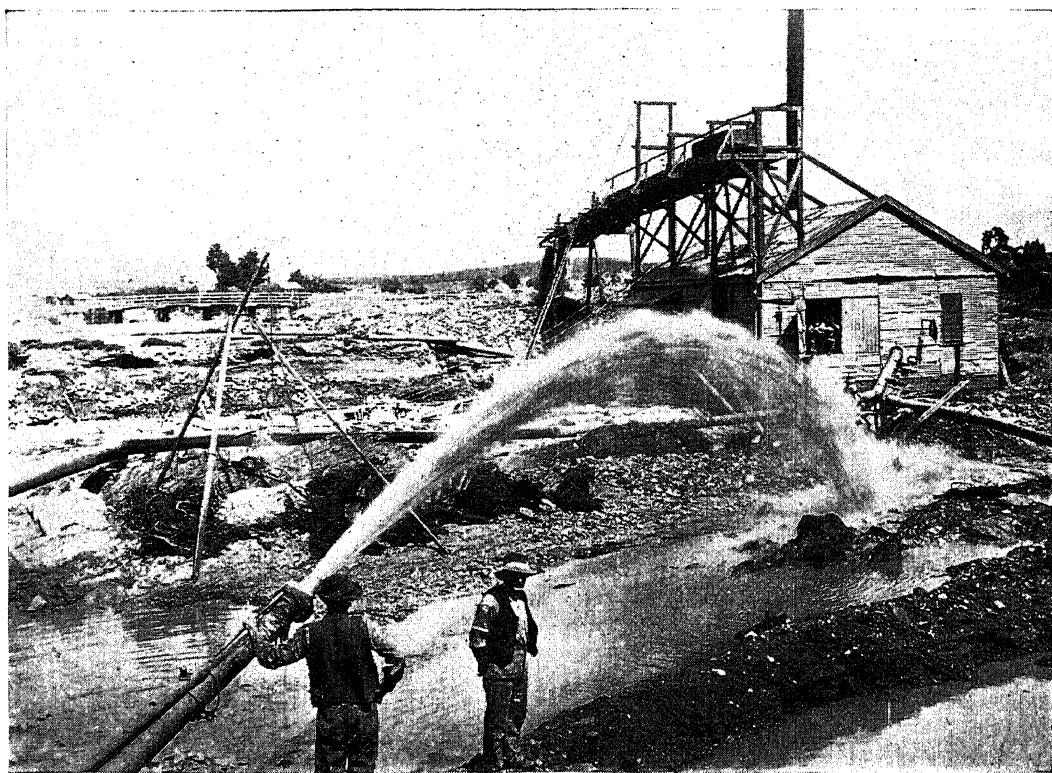


Photo: Visual Education Service

## HYDRAULIC SLUICING FOR GOLD IN AUSTRALIA

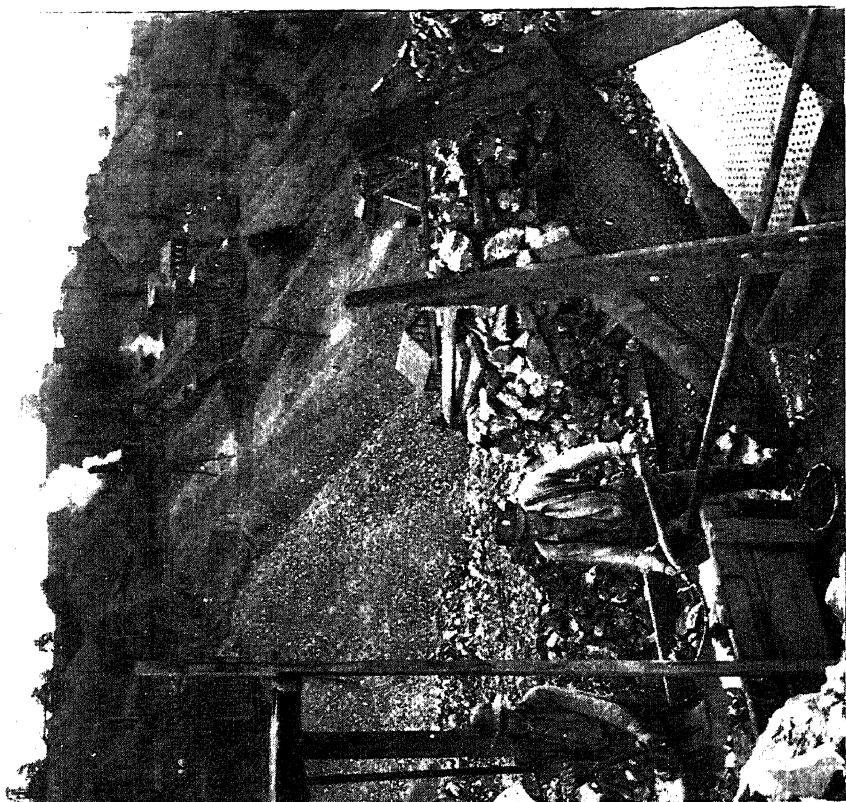
to any of the practical everyday uses to which any of the cheaper metals are equally well suited. No other metal has ever been found which is so satisfactory for coins of high value, for jewelry and ornaments, and for dentistry, and most of the gold mined is used for these purposes, for gilding or lettering, and for coloring glass and chinaware. About one-fourth of each year's production of gold, it is estimated, is used for coins.

In its pure state, gold has one quality which unfits it for hard usage—it is soft; and consequently it is almost always mixed with a harder metal, the mixture being known as an alloy. A finger ring of pure gold would not hold its shape well; a coin of pure gold would wear away quickly; so in making the former, a mixture of silver is used, and for the latter about eight to ten per cent of copper. Copper deepens and reddens the color, while silver lightens it, and the proportion of either of these metals used in an alloy is determined in part by the color desired. The pureness of gold used for jewelry is measured in *carats*, and "twenty-four carats" is the standard of measurement, for it means absolute pureness; that is, a carat is one twenty-fourth part of the whole. In nearly all countries, gold coins are made nine-tenths pure. The Austrian ducat

has 98.6 per cent of gold and 1.4 per cent of copper. The British sovereign, which is 91.7 per cent gold and 8.3 per cent copper, contains twenty-two carats; the American gold coin of ninety per cent gold and ten per cent copper contains 21.6 carats. Most twenty-carat gold has twenty parts of gold to four of a harder metal; eighteen-carat gold has two less; but articles made of this alloy have a right to be called "solid gold," for this simply means that they are of gold or the gold alloy all through, rather than having a plating of gold over a basis of some cheaper material.

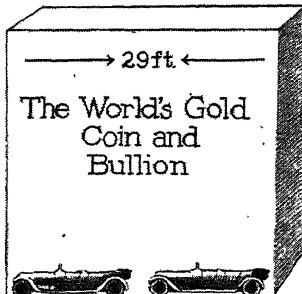
Gold has two properties which are far more interesting than any of those mentioned above. It can be hammered out into a sheet of incredible thinness, or, to speak technically, it is the most *malleable* of the metals (see subheads *Gold-Beating* and *Gold Leaf* below); and it is extremely ductile—that is, it can be drawn out to a great length without breaking. As regards this latter quality, skilful operators have drawn gold out into such a tiny wire that it takes 680 feet of it to weigh one grain, or about 900 miles to weigh a pound avoirdupois. But the gold, to be thus treated, must be pure. If one two-thousandth of its weight of lead, for instance, be added to the gold, the wire cannot be made.

In Quest of Gold. Left, miners at work in the Yukon district. Right, Bullhead mine, in the Colorado gold field.



**Gold in Chemistry.** Like every other element, gold has its chemical symbol, for it would be unwieldy, in speaking of chemical compounds, always to use the full name of every element; and since the Latin name for gold is *aurum*, its symbol is the abbreviation *Au*. In a paragraph above, mention is made of some of the alloys of gold, and the article **ALLOY** has more to say on the same subject. Now many of the alloys are mixtures, and not chemical compounds; that is, each substance which enters into the alloy keeps its own individuality and properties. This is true of the alloys of gold with silver and copper, and also of gold amalgam (the alloy with mercury). But gold does combine with certain substances to make real compounds. With aluminum it forms a brittle purple, and with zinc a brittle violet, compound. Alloys with iron, used in jewelry in France, are known as gray gold and blue gold, on account of the modifications of the yellow color resulting from the formation of alloys. White gold, also used extensively for jewelry, is an alloy of gold and silver.

Looking at gold and touching it, one would think that so solid and heavy a substance could not be dissolved, and indeed, most acids or other liquids have no more effect on it than does water. On account of its resistance to oxidation, the alchemists called gold a *noble* metal or *the king of metals*. However, chlorine it cannot resist, and in water saturated with that gas, it is dissolved as readily as is salt in hot water. A mixture of nitric and hydrochloric acids also dissolves gold readily, owing to the liberation of chlorine by the interaction of the two acids. On account of this effect on the royal metal, the alchemists named this mixture of acids *aqua regia*, that is, the *royal water*. When this solution is evaporated, yellow crystals of auric chloride are obtained. This gold chloride is used in "toning" (that is, modifying the color of) photographs. In the presence of air, a solution of sodium (or potassium) cyanide dissolves gold. This fact is utilized in industry in extracting the metal from its ores.



THE GOLD OF THE WORLD

All the money of the world, except that of the few countries which have a silver, nickel, or paper standard, is based on about \$8,000,000,000 in gold. A cube of gold of this value would measure twenty-nine feet on each edge. The automobiles in the illustration help us to visualize the size of such a solid.

**How Gold Exists in Nature.** Long, long ago, people did not delve deep in the earth for their supply of gold. They just took what Nature had left ready for them on the surface. Gold was frequently found then, as it is sometimes found to-day, mixed with the sand and gravel along a river course. When so found, it is in a pure state or mixed with silver, and occurs in all sizes from tiny particles like grains of glistening sand to nuggets of fair size. So far as is known, the largest nugget ever found thus free in the sand and gravel was discovered in Victoria, Australia, and weighed 183 pounds. It is hard to conceive of the intense excitement which must have prevailed when this \$50,000 lump of gold was picked up.

To obtain gold from such alluvial sources, only a simple washing is necessary. These surface deposits are called *placer* mines, and most of them are shallow and quickly exhausted. Naturally, they are the more conspicuous and enticing sources of gold, and in almost every case where the discovery of gold has been followed by the rush of thousands to the spot, it has been metal of this easily attainable variety that has been first sought. The "forty-niners," for example, who formed the endless caravan across the desert to California, were seeking placer-gold, and the first findings in the Klondike region, in Australia, and in South Africa were of the same variety. At first, every man washed his own gold in a simple sheet-iron *pan*, but later, hydraulic machinery was introduced—powerful machinery which by means of its forcibly driven streams of water, tears out gravel and soil and boulders in the gold-bearing regions, and, by a system of gratings, separates the gold from the worthless material. This is a wasteful process—wasteful, not of gold, but of soil—and it has been practically forbidden in well-settled places, as in California. To take its place, in sections where placer gold exists, a method employing dredges has been introduced.

Not all gold exists in this free state. Much of it exists in ores or gold-bearing rock, and must be mined like any other metal, by means of great shafts sunk into the earth. In Western Australia, Transylvania, and Colorado, large quantities of a compound of gold with tellurium (formula  $\text{AuTe}_2$ ) are found. This is a gray or black ore, though an admixture of free gold sometimes gives it a brass-like color. Gold-bearing ores are especially plentiful in mountainous regions.

**Taking Gold from the Ores.** After the rock with its precious admixture of gold is brought to the surface, there remains much to be done before the gold is in an easily recognizable state.

The miner has no nuggets of pure gold to carry about in his pocket, or to tie up into a long string in the fascinating manner of a

Bret Harte hero; it was placer gold entirely with which these men dealt. The treatment given gold-bearing ore depends largely on what other substances enter into its composition, but the preliminary process is usually the same. The ore is crushed and ground to a fine powder by a stamping machine, and is then passed over copper plates covered with mercury. This substance has a strong affinity for gold, and as the ore passes over it, it draws out the gold particles and lets the other material pass by. The pulpy mass of mercury and gold which results is known as *amalgam*. This is first squeezed, to force out the excess mercury, and the hard amalgam which remains is heated until the mercury distills and passes off in vapor, leaving the gold.

There are other processes of extraction in which the gold is dissolved by chlorine or by cyanides, and afterward reprecipitated from the solution, but these are more complicated than the amalgamation process described above. Frequently, they are used in combination with the above, to recover the gold which the mercury has allowed to escape.

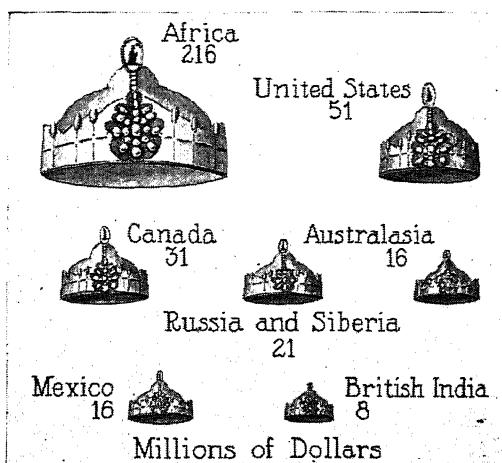
**Where Gold Is Found.** Gold is widely distributed over the earth, and wherever it is known or believed to be, men are certain to find their way. In the fifteenth and sixteenth centuries, there was a legend which told of a wondrous region called *El Dorado*, "the golden," where gold was reputed to be as common as sand, and many of the exploring parties which set out from Europe during that period of romance and adventure were in quest of that marvelous country. They never found it, but in the nineteenth century, several discoveries were made which caused people to exclaim at first, "*El Dorado, surely!*"; for so rich did the possibilities seem in California, in Australasia, in Alaska, in South Africa.

Since the beginning of the twentieth century, the world's annual production of gold has ranged in value from \$319,000,000 to \$470,000,000, in round figures. In this production the continents rank in the following order: Africa, North America, Asia, Oceania, South America, and Europe. Africa produces about sixty per cent of the world's output of gold; the United States and Canada each produce more than Asia, Oceania, South America, or Europe.

**United States.** Though gold has been found in the eastern slope of the Appalachian Mountains, the production of the United States is largely in the Western states and Alaska. California, Colorado, Alaska, Nevada, South Dakota, Arizona, Montana, and Utah have each an annual yield valued at several million dollars. For many years after the sensational discovery of gold in 1848, California was without a rival as a gold-producing state; it still holds first place as a rule, though Colorado takes precedence in some years. During the

period since the beginning of the present century, the value of the annual production for the country as a whole has ranged from \$101,-000,000 down to \$49,000,000. For several years after the World War, the annual average was about \$50,000,000.

**Canada.** Ontario, British Columbia, and the Yukon are the chief gold-producing provinces.



The proportionate sizes of the golden symbols are helpful in comparing the production of gold in the leading countries, for five years' average.

The annual output of the Dominion in highly productive years is approximately half that of the United States. During the height of the exploitation of the placer mines of the Klondike, the Canadian output reached a value of \$27,000,000. Thereafter, production decreased until 1912, when the Porcupine district in Ontario was opened. Ontario since then has produced steadily, and its gold yield is not only greater than that of the rest of Canada, but is more than that of California and Colorado combined. It promises to hold and perhaps better its position, for a rich new vein in the Red Lake district of the province was discovered in 1925, and is being rapidly developed.

**Africa.** The richest gold field in the world is in the Transvaal and Rhodesia, South Africa. Over one-half of the world's supply of gold, in normal years, is secured from that region. Gold in profitable amounts is also mined in British West Africa.

**Elsewhere.** In Australasia the placer mines have largely been exhausted, but the deep mines still yield, though the output is declining. Western Australia has always been the leading gold-producing state of the Commonwealth; its annual yield is greater than that of the other states and New Zealand combined. In South America, Colombia is first; in Asia, India; and in Europe, Russia.

**Gold-Beating.** As stated above, gold is so malleable that it can be hammered into very thin sheets—so thin that it takes more than 367,000 to make a pile an inch high! The process by which these thin sheets are made is known as *gold-beating*, and is carried on as follows:

A very small amount of either copper or silver, according to the color desired, is mixed with the gold, which is subjected to a very great heat to render it more malleable. It is then cast into a bar, which is passed between rollers and flattened into a ribbon one eight-hundredth of an inch in thickness. This is cut into pieces about one inch square, which are laid between leaves of a very thin, tough paper. Exactly in the middle of each leaf the gold is placed, and the alternation of gold and paper is continued until there are 210 sheets of gold in the little pile, which is called a *catch*. This is bound in parchment, laid on a marble block, and beaten for twenty minutes with a large hammer which weighs sixteen or seventeen pounds. The catch has so much elasticity that the hammer actually rebounds, and does not need to be lifted.

When the first beating stops, the little gold sheets are three and one-half inches square. Each one is then cut into four squares, and these are placed between leaves of gold-beater's skin, a special membrane prepared from the intestine of the ox. The beating is continued with a ten-pound hammer for about two hours; the gold sheets are again taken out and quartered; and a third beating with a seven-pound hammer reduces them, after about four hours, to their final state, when they are known as gold leaf.

**Gold Leaf.** The incredibly thin leaves, through which the light can now filter, are taken up with wooden pincers, laid on a leather cushion, and trimmed, with a knife made of rattan, to sheets three and one-half inches square. Twenty-five of these, between sheets of paper, make up a "book," and the books are sold in packs of twenty. The ordinary gold leaf of commerce is not reduced to the very minimum thinness, but each leaf is about  $\frac{1}{1000}$  of an inch in thickness.

Gold leaf, as used in the arts, is familiar to everybody. It appears in the lettering on book covers, on picture frames, on furniture, on pottery—everywhere, in fact, where gilding is used; for most gilding is done by means of gold leaf. On the Egyptian mummy cases which have lain in the tombs for thousands and thousands of years, there are numerous examples of such gilding, which show that the ancients must have understood gold-beating almost as well as do modern artisans.

Dentists, too, use large quantities of gold in the form of gold leaf, gold pellets, and sponge gold. The latter is about one-sixteenth

of an inch in thickness, and pierced with small holes like a sponge. The gold leaf used in dentistry is not the very thinnest variety, as the beating is not carried beyond the *catch* stage, and it must be pure gold and not an alloy.

Gold lace consists of very fine strips of gold twined around silk. It contains only about two and one-half per cent of gold. Precipitated gold (purple of Cassius) is used in the manufacture of ruby glass.

T.B.J.

**Related Subjects.** Further information connected with gold may be obtained from the following articles in these volumes:

|           |                   |
|-----------|-------------------|
| Alchemy   | Ductility         |
| Alloy     | Gravity, Specific |
| Amalgam   | Malleability      |
| Carat     | Mining            |
| Chemistry | Money             |

**GOLD-BEATING.** See GOLD, subhead.

**GOLD CERTIFICATES.** See MONEY (Monetary System of the United States).

**GOLD COAST**, a British colony in West Africa, with a coast line of 334 miles, extending along the Gulf of Guinea. It owes its name to the abundance of gold found in all parts of the colony. The area of the Gold Coast itself is about 25,000 square miles, but when Ashanti and the Northern Territory were annexed in 1901, the boundary was pushed over 300 miles inland, giving the colony a total area of 80,000 square miles. The climate is unhealthful, and few Europeans can withstand the fevers prevalent in all parts of the colony. The soil is wonderfully fertile, and produces coffee, cacao, tobacco, cotton, and spices. The chief exports are gold, copra, palm oil, rubber, and cacao.

Over the entire territory there is a governor, appointed by the British Crown. Ashanti and the Northern Territory each have separate chief commissioners. The chief towns are Kumasi, capital of Ashanti, Accra, Cape Coast Castle, Keta, Sekondi, and Winnebah. Population, 2,000,000; about 2,200 are white.

**GOLD CURE.** See KEELEY, LESLIE.

**GOLDEN AGE**, a term used to represent the period of highest development in literature and art in a country. The Romans used it to describe the ideal time when, under Saturn's reign, the earth produced without cultivation, and happiness, peace, and sinlessness prevailed. It is broadly applied to the fanciful era, usually of extreme youth, before one's illusions are lost. See AGE (Historic Ages).

**Golden Ages of Ancient Nations.** Some of them are listed as follows:

Assyria, 700 to 600 B.C., or to the fall of Nineveh.  
Babylonian Empire, 606 to 538 B.C., or to the reign of Belshazzar.

China, 618 to 626, the reign of Tae-tsung, and 626 to 684, Tang dynasty.

Egypt, 1350 to 1273 B.C., XIX Dynasty.

Media, 634 to 594 B.C., reign of Cyaxares.

Persia, A.D. 531 to 629.

**Golden Ages of Modern Nations.** These may be listed as follows:

England, 1558 to 1603, the reign of Elizabeth.  
 France, 1640 to 1740, parts of the reigns of Louis XIV and XV.  
 Germany, 1519 to 1558, reign of Charles V.  
 Portugal, 1383 to 1578, from John I to end of Sebastian's reign.  
 Prussia, 1740 to 1786, reign of Frederick the Great.  
 Russia, 1672 to 1725, reign of Peter the Great.  
 Spain, 1474 to 1516, reign of Ferdinand and Isabella.  
 Sweden, 1523 to 1632, from Gustavus Vasa to Gustavus Adolphus.

**GOLDEN APPLE, THE.** See TROY (Trojan War); APPLE OF DISCORD.

**GOLDEN BULL.** This term, which is a literal translation of the Latin words *bulla aurea*, was applied originally to any charter decorated with a golden seal, or *bulla*. Later, the name was limited to important political documents of the Holy Roman Empire [see GERMANY (History: Another Rise and Fall)]. At present, a letter or order of the Pope, when published and sent to Roman Catholic churches, is known as a *Papal bull*. See BULL.

**GOLDEN CALF.** An image made by Aaron in response to the demands of the Israelites (*Exodus xxxii*, 1-8). Moses had retired to the mount where he later received the tablets containing the Commandments. The people took advantage of his absence to set up an image that they could worship, which incited the wrath of Moses upon his return. Image worship was then common among heathen people, although condemned by the leaders of Israel (*II Kings xii*, 28, 29). It has been assumed that the worship of the Golden Calf by the people of Israel was the same as the Apis worship of Egypt, although in Egypt, the Apis, or bull, was worshiped in the form of a living animal, and not as an image.

**GOLDEN CHAIN.** See LABURNUM.

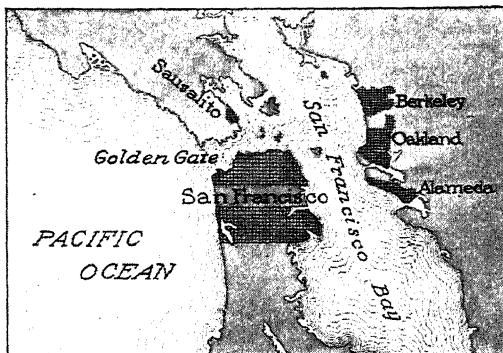
**GOLDEN CLAVARIA.** See MUSHROOMS.

**GOLDEN-CROWNED THRUSH.** See OVEN BIRD.

**GOLDEN FLEECE,** in Greek mythology, a fleece of gold which was guarded by a dragon in a grove sacred to Mars, in the city of Colchis, on the shore of the Black Sea. That Jason might prove himself worthy of the throne of his father Aeson, which he claimed from the usurper Pelias, his uncle, he was commissioned to bring back the Golden Fleece. He started on this perilous adventure with a band of heroes, who sailed in the ship *Argo*. Many were the thrilling experiences which the Argonauts encountered, but Jason secured the Fleece and returned to demand the abdication of Pelias. See ARGONAUTS; JASON; MEDEA; THESSALY.

**GOLDEN GATE, THE,** the picturesque channel which connects San Francisco Bay with

the Pacific Ocean. Anyone who has crossed the bay, even in an unromantic ferry boat, and has looked out through the Golden Gate at



THE GOLDEN GATE

sunset, has seen a picture which he is not likely to forget. The channel is in effect but a mountain pass—a mountain pass with a branch of the ocean overspreading it. The passage between the hills, deep enough to admit the largest steamers into the harbor, is one mile wide and four miles long. Some accounts say that Drake named the Golden Gate far back in the sixteenth century, but J. C. Fremont in his *Memoirs* claims the honor for himself. For a contemplated bridge across the Golden Gate, see SAN FRANCISCO.

**GOLDEN HORN,** a name given to a beautiful harbor, an inlet of the Bosphorus, on which stands the city of Constantinople. It is six miles long, about half a mile wide at the widest part, and more resembles a river than a harbor. It is deep, well sheltered, and capable of accommodating 1,200 large ships at anchor. On the eastern shore of the Golden Horn are the beautiful suburbs of Pera and Galata. The city of Constantinople now consists of



THE GOLDEN HORN

several closely grouped towns and villages on both sides of the Golden Horn. Galata, magnificently situated on land overlooking

the harbor, is the modern business center—the location of banks, postoffices, and steamship offices. Pera, the residential section, is occupied by homes of European business men, embassies, and the most modern and fashionable hotels and shops. From the sea, the golden gleam of minarets presents a sight never to be forgotten. For illustration of the great city, see CONSTANTINOPLE.

**GOLDEN LOOSESTRIFE.** See *LYSIMACHIA*.

**GOLDEN ROBIN.** See *BALTIMORE ORIOLE*.

**GOLDENROD.** The goldenrods are the most familiar and abundant of North American late-summer and early-autumn wild flowers. They belong to the composite family, and are



Because its myriad glimmering plumes  
Like a great army's stir and wave;  
Because its golden billow blooms,  
The poor man's barren walks to lave:  
Because its sun-shaped blossoms show  
How souls receive the light of God,  
And unto earth give back that glow—  
I thank Him for the Goldenrod.

—Lucy LARCOM: *Goldenrod*.

thus related to asters, cosmos, daisies, thistles, and sunflowers. Most of the eighty to a hundred species are found in North America; a few are native to the continent of Europe, and one species grows in Great Britain. Goldenrods are such favorites among Americans that the suggestion has often been made to adopt the goldenrod as the national flower of the United States. No official action has ever been taken, but goldenrod and columbine are perpetual rivals for the honor. Alabama, Kentucky, and Nebraska, however, have voted to adopt the goldenrod as their state emblem. A typical goldenrod has a slender, wandlike stem, smooth or hairy, which bears thick clusters or graceful plumes of compound,

bright-yellow or deep-golden flowers. The leaves, smooth or hairy, even or tooth-edged, may be seen swaying by dry roadsides, in moist woods, in swamps and peat bogs, or in cultivated gardens. Though popularly supposed to cause hay fever, goldenrod pollen is too moist and sticky to be much of a factor in the spread of this ailment. Pollens of ragweed and some other weeds, of the light, wind-borne sorts, are the real culprits.

Among the well-known species are the *early goldenrod*, often dried for interior decoration; the large, handsome *Canada goldenrod*; the *blue-stemmed*, the *showy*, and the *sweet*, or *Blue Mountain tea*. The Canada goldenrod yields a strong fiber, but is not used commercially. The leaves of sweet goldenrod are brewed to make tea, and they also yield an oil employed in medicine as a tonic. Many of the goldenrods are valued as forage. Goldenrods are easily transplanted into gardens, and nursery men offer some of the finer species for sale.

B.M.D.

[Thomas A. Edison has developed rubber from goldenrod, but the process has been found expensive; the product will not be available commercially.]

**Scientific Names.** The goldenrods constitute a genus of the family *Compositae*. Early goldenrod is *Solidago juncea*; Canada goldenrod, *S. canadensis*; the blue-stemmed is *S. caerulea*; the showy, *S. speciosa*; the sweet, *S. odora*.

**GOLDEN RULE**, a term applied to the principle of conduct twice enunciated in the New Testament. The form given in *Matthew* vii, 12, is that generally current: "Therefore all things whatsoever ye would that men should do to you, do ye even so to them: for this is the law and the prophets" (see also *Luke* vi, 31). This admonition is widely accepted as a fundamental requirement of morality, especially from the point of view of practical affairs.

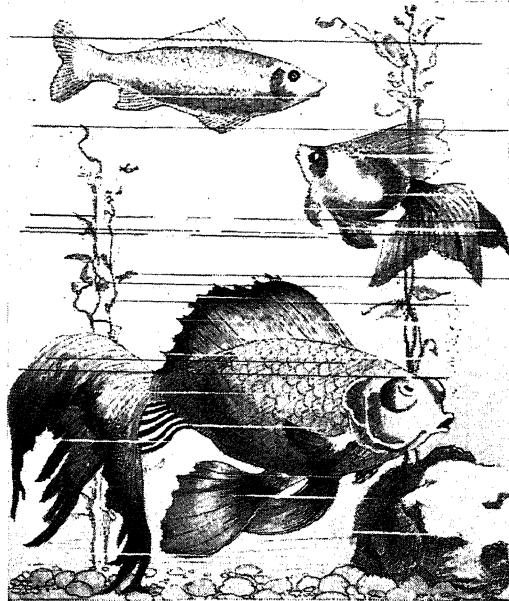
**GOLDEN STATE**, a popular name applied to California (which see).

**GOLDEN-WINGED WOODPECKER.** See *FICKER*.

**GOLDFINCH.** See *AMERICAN GOLDFINCH*.

**GOLDFISH**, a species of domesticated fish belonging to the carp family, which has been bred from remote times for the development of beautiful coloring. In public and private aquaria, in ponds, and in small glass bowls in homes, one sees these handsome, darting creatures, the most widely used of all ornamental animals. The wild ancestor of the goldfish is of Chinese origin. The Chinese began breeding the plain, greenish-colored progenitors of the modern goldfish thousands of years ago, but much credit for the many beautiful varieties seen to-day is due the Japanese. Goldfish-breeding has been carried on in the United States since 1878, when specimens of

Oriental fish were placed in the government nurseries at Washington by the fish commission. Now there are goldfish farms in many



THREE FORMS OF GOLDFISH

parts of the country, and various cities are the headquarters of goldfish societies. There are about a score of well-recognized varieties on the market, distinguished by such names as Comet, Nymph, Fantail, Veiltail, and so on. Red, gold, orange, bronze, silver, gray, brown, black, white, and other shades are seen in many combinations.

Goldfish require little care when given the proper environment. The water should not be too cold, and should be changed or refreshed as required. A water plant should be kept in the aquarium, as it will give off oxygen needed by the fish. Specially prepared food, fed once a day, is best for these fish. A glass box with straight sides will give more air than a curving bowl.

L.H.

**Scientific Name.** The species from which the many varieties are derived is *Carassius auratus*.

**GOLD LACE**, a handsome fabric woven of gilded silk thread, used for decorating uniforms, liveries, altar cloths and ecclesiastical robes, banners, and theatrical dress, as well as for ornamentation in women's apparel. To make the thread, a rod of silver is covered with gold leaf and drawn between perforated diamonds or rubies until it becomes a fine wire. The finest of such wire is so delicate that a mile and a quarter of it weighs only an ounce. It is then wound around with silk thread, and the resulting thread of golden luster is woven into lace. *Silver lace* is similarly made.

**GOLD LEAF.** See GOLD, subhead.

**GOLDSBORO**, N. C. See NORTH CAROLINA (back of map).

**GOLDSCHMIDT, MADAME OTTO.** See LIND, JENNY.

**GOLDSMITH, OLIVER** (1728-1774). An appreciative biographer of this English author writes thus of Goldsmith and his contemporaries:

We venerate Dryden, we admire Pope, we esteem Young, we quote Gray, we neglect Thomson, we ignore Johnson, we tolerate Cowper, but we love Goldsmith.

Of all the eighteenth-century writers who are named here, Goldsmith is not only the best loved, but he is the one who is most widely read by the modern age. Yet he did not have a promising boyhood or youth. The son of a poor Irish curate, young Oliver was so lazy and inattentive that his teachers called him a dullard. Though he managed to win a degree at Trinity College, Dublin, in 1749, he failed successively in the professions of the ministry, teaching, and medicine. Later, we find him wandering over Europe, sometimes reduced to earning bread and lodging by playing the flute for dancing peasants.

Not until he took up literature did Goldsmith make a success of life. Beginning as a hack-writer for London booksellers, he soon won public notice by a series of letters written under the title *A Citizen of the World*, published in 1760 and 1761. Charming in style, and revealing their author's delightful personality, they so pleased Samuel Johnson that Goldsmith soon found himself a member of the London Literary Club, to which celebrities of that day belonged, and of which Johnson was a leader. Goldsmith's literary work continued until his premature death, in his forty-seventh year.

**Summary of His Work.** Goldsmith's novel, *The Vicar of Wakefield*, and his uproariously funny comedy, *She Stoops to Conquer*, are regarded as classics in their fields. As a poet, he is remembered chiefly for *The Deserted Village*, a poem which touchingly describes the decay of the little town where he spent his boyhood, and in which his father is portrayed in the person of the country parson. Its opening lines follow:



OLIVER GOLDSMITH

Much of his work is included among the literary treasures of English-speaking people. He wrote with grace and sweetness, and tender, pathetic charm.

Sweet Auburn! loveliest village of the plain,  
Where health and plenty cheered the laboring swain,  
Where smiling spring its earliest visit paid  
And parting summer's lingering blooms delayed.  
Dear lovely bowers of innocence and ease,  
Seats of my youth, when every spot could please,  
How often have I loitered o'er thy green,  
Where humble happiness endeared each scene.

*The Deserter Village* and *The Vicar of Wakefield*  
both show a departure from the artificial standards

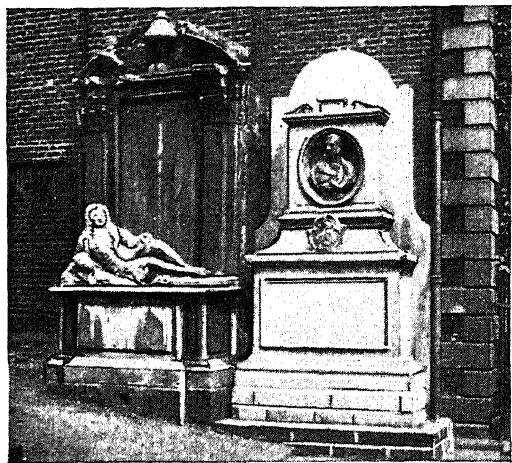


Photo: O. K. O.

## GOLDSMITH'S TOMB

In the courtyard of the Temple Church, London. of the eighteenth century; in its sincerity and sympathy for nature and humanity, the former belongs

rather to the new school of the nineteenth century (see ROMANTICISM). *The Vicar of Wakefield*, a delightful narrative of village life, is aimless in plot and weakened by absurdities, but it is justly admired for its simple and charming style, engaging humor, and excellent character-drawing. Dr. Primrose, the vicar of Wakefield, is one of the enduring creations in English fiction. Other Writings include *The Traveler*, a poem equal in merit to *The Deserter Village*; and a comedy entitled *The Good-Natured Man*.

Goldsmith's conversation had little of the charm of his writings, and his friends took great delight in an "epitaph" which said:

Here lies Nolly Goldsmith, for shortness called Noll,  
Who wrote like an angel and talked like poor Poll.

**GOLDSMITH BEETLE**, a large, yellow beetle, native to the Eastern United States. During the daytime it hides among the leaves of trees, particularly the willow. Only at night does it fly about. Its large eggs are placed in the ground, where three years of larval stages are spent. The scientific name is *Cotalpa lanigera*; the family, *Scarabaeidae*.

**GOLD STANDARD.** See MONEY (Gold and Silver Standards).

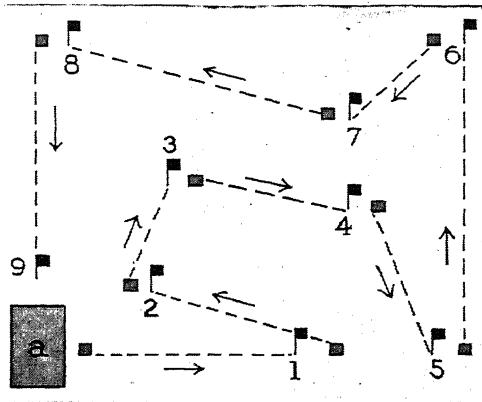
**GOLDTIT, OR VERDIN**, a small, golden-headed bird of the titmouse family. Its home is in Texas and Southwestern United States. Its body is an ashen color, and the breast is white. The nest, often quite large, is spherical in shape, and made in a thorny tree. The eggs, usually four to six in number, are a pale blue, with brown speckles. Scientific name, *Auriparus flaviceps*.



**GOLF**, a popular game for both sexes, played in large spaces in the great out-of-doors, under conditions which promote bodily health, develop physical control, and increase mental alertness. A "short course," or playing ground, requires at least sixty to seventy acres of ground, while a "long course" needs 150 acres or more, to give players the fullest measure of enjoyment and opportunity to develop masterful playing. The game attracts the greatest number of players in thickly populated centers, where a hundred or more may combine to lease or purchase the needed ground and prepare it for use.

**The Course.** The playing field does not require stated dimensions or regular shape. A so-called "short course" demands sufficient space to locate nine "holes" from 100 yards to 500 yards apart. The direct distance between the holes must be on lines that are not crossed or closely approached by each other. This latter is a requirement for the safety of the players; those on any part of the course must feel secure from flying shots from the clubs of other players. It is always desired that the distances between holes shall vary as much as possible; more skill is then demanded in judging shots. Whether the course be one

of nine holes or of eighteen holes, the arrangement should be such that the last hole is near the starting point. In the first half of the game,



A NINE-HOLE COURSE

(a) Club house, close to which is the starting point, or first "tee." This diagram presents one acceptable route; others could be suggested.

the participants are "playing out," or moving away from the starting point; in the second half, they are "playing in," or approaching the point from which they began to play.

The field may be entirely level, a condition favored by beginners, or it may be quite hilly and wooded in places. The hazards of the game increase with the difficulties the surface of the course presents. On flat courses, artificial mounds of earth, called *bunkers*, are reared to develop greater playing skill; these are also given the general term *hazards*. In front of a hazard a long, narrow pit may be dug to a depth of over a foot, and its bottom covered with several inches of shifting sand. This adds greatly to the difficulties of the unfortunate player whose ball falls into the pit, for several shots may be wasted before the ball is again on the fairway.

Each hole is really a metal cup  $4\frac{1}{2}$  inches in diameter and of equal depth, sunk into the ground until its top is level with the surface. The ball must be knocked into the cup, a feat requiring considerable skill. To facilitate this play, the turf on all sides of the cup for about thirty feet is made very smooth. It is usually heavily grassed, and the grass is kept closely cut; sometimes, however, it is a hard clay or packed-sand surface. This square is called the *green*, and the play on the ball toward the cup from any point on the green is called *putting* (the *u* is given the short sound, as in *but*).

**The Game.** One person may play alone—a "single"; two may play a match game—a "twosome"; three—a "threesome"; or four—a "foursome." Only once in playing each hole may the ball be placed definitely in position for a stroke, and that is for the first stroke off

each starting place, or *tee*. In these instances a small mound of sand about an inch high may serve as a base upon which to rest the ball. The ball is then struck by a club called the *driver*; it is sent as nearly as possible in the direction of the first hole, and at the spot where it drops, another club, the *midiron*, *cleek*, *brassie*, *niblick*, or other of special shape, is called into service to advance it once more toward the cup.

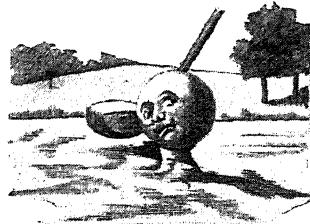
These clubs are classified below. Each attempt to hit the ball, whether successful or not, counts as one *stroke*; the person who puts his ball into the cup with the fewest strokes wins the hole, and the one with the lowest score for the total number of holes wins the game; this method of scoring is called "medal" play. Sometimes, by agreement, a game may be decided upon *holes won*, rather than upon the number of strokes; this is "match play."

When each of a group of players has "holed out" of the first cup, all move a few yards to the second tee, or second starting place, and proceed to drive in the same manner as from the first tee. Thus the game continues through the nine or the eighteen holes.

A ball shot into shrubbery or behind trees, from which position it cannot be struck, may be picked up and thrown into the fairway, with a penalty of one stroke; if it lands in a sand pit, or in any other position where the use of a club is possible, it must not be touched by the hand. If a ball is lost, another may be put into play, with a penalty of one stroke;

when this is done the new ball is placed on the fairway not nearer the green than the supposed location of the one that was lost.

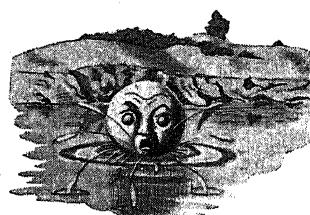
**Implements of the Game.** The all-necessary implement is the ball. It is 1.62 inches in diameter, with surface meshed or dimpled to



"Now for an awful bump!"



"He'll never find me!"



"I'm a sinker!"



Photo: Wide World

## THE APPROACH TO THIS GREEN PRESENTS UNUSUAL HAZARDS

The green is on the tip of land which projects farthest into the sea, where the tiny white spot appears in the exact upper center of the illustration. It is hole eight at Del Monte, Calif. The larger white spots are sand-traps.

resist slipping on impact with the club. The covering is gutta-percha, the interior a semi-elastic composition. In some balls the core is hollowed and contains a fluid; this adds to their resiliency.

The golf enthusiast is tempted to fill his golf bag—cylindrical in form, about six inches in diameter and three feet long—with eight or ten clubs, each of which has its peculiar uses, but not all of which are essential. Every player should have four clubs, but a few, lacking desire to excel, use but two, a midiron and a putter. The clubs average forty inches in length, varying somewhat to meet the needs of players; those considered most necessary are the following:

**Driver.** This is one of two clubs having a wooden head, the other being the *brassie*. The player who follows the best traditions of the game invariably uses the driver on the ball at the tee.

**Midiron.** The midiron is so called because it is the club most used in drives in midfield, when the green to be approached is from 100 to 150 yards ahead. The iron head is bent to a slight angle, to elevate the ball only enough to assure good distance in the shot.

**Mashie or Loftier.** Frequently a bunker, sand pit, tree, or other hazard lies across the path, and the shot must go above it. A club with an iron head bent more obliquely than the midiron is then required; the mashie raises the ball into the air; the player sacrifices distance to secure height.

**Putter.** This club has a shorter handle than any other, and is used only after the ball has been shot upon the green. The short handle requires the player to lean toward the ground, from which position he can better judge the direction and strength of stroke required to sink the ball into the cup.

Other clubs are found desirable by almost all classes of players. The two named below are particularly recommended.

**Brassie.** This club is of wood and differs from the driver in that its driving surface is slightly more oblique, to loft the ball, and its base is brass-covered, that it may slip over the turf without friction. It is used in the fairway when considerable distance is desired.

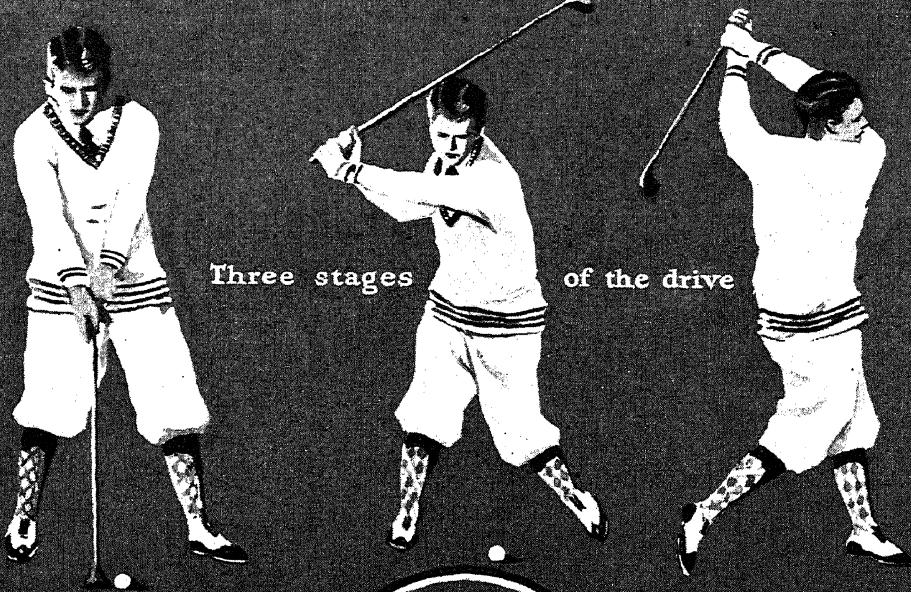
**Niblick.** A spoon-shaped club with broad flat side to receive the impact is a useful tool with which to loft the ball sharply out of a pit or over a close and high obstruction. The pitch of the niblick is more oblique than that of any other club.

Professional players and very ambitious amateurs use all of these clubs and sometimes others, of doubtful value to the average player. The *cleek*, with an iron head set perpendicularly, assures great forward distance, with little rise above the ground. Few players succeed with it, as their shots are likely to fly low and be stopped by the grass.

**To Develop Good "Form."** An article of this nature cannot give playing rules or directions the "golfer" should follow. How to stand beside the ball, how to handle the clubs, how to effect a stroke—all these require technical descriptions which the novice sometimes finds difficult to interpret. The best way to secure improvement is to study carefully the methods of the best players, unless one is able to hire a professional for a number of lessons.

When entered upon in the proper spirit, golf compels courtesy, patience, control of the emotions, and prompt acknowledgment of the rights of others.

**Brief History.** It is believed that a game similar to modern golf originated with the



Three stages  
of the drive



A  
champion's  
grip



Explosion shot

Putting

Iron shot

Dutch, but credit belongs to Scotland for developing it to its present standards and handing down its traditions. Formerly it was solely a "gentleman's game," reserved to few men, whose wealth made great courses possible. These men observed to the highest degree the ethical and social requirements so dear to the Scotch golfer, and with such a standard the game reached America in 1888. For many years, only men of leisure played; the participation of women did not follow for a dozen years. Gradually, in city parks golf courses were laid out, and the response of the general public was instantaneous. By 1910 many women were playing, their number constantly increasing until on some city courses the sexes are nearly equally represented. Chicago is reputed to hold a greater proportion of players to the total number of inhabitants than any other city in America; there the public courses are so crowded that, on rest days, people are in line at two o'clock in the morning to secure early playing privileges. There are in that city ten public courses; within twenty-five miles of the business center are 157 private and pay courses. New York City provides several public courses, but within a short distance from the center of business there are over a hundred private clubs.

C.B.F.

**GOLGOTHA**, *gol' go thah*. See JESUS CHRIST.

**GOLIATH**, the giant from Gath (which see), famous only for the fact that he was said to have been killed by the youth David. The story of the encounter is told in the article DAVID.

**GOMBO**. See OKRA.

**GOMEZ, JOSE MIGUEL**. See CUBA (History).

**GOMORRAH**, *go mahr' ah*. See SODOM.

**GOMPERS, SAMUEL** (1850-1924). The efforts of this American labor leader in behalf of organized labor made him a figure of national prominence during a long period of years. He was one of the organizers of the American Federation of Labor in 1881 (see LABOR ORGANIZATIONS), and, with the exception of one year, served continuously as its president until his death. In 1921 he was elected to the office for the fortieth time. Gompers was

born in London, but emigrated to America when he was thirteen years old; a year later he began his association with organized labor, by be-

coming the first registered member of the Cigar-Makers' International Union. This organization became, through his efforts, one of the most successful trade unions.

It was his policy to work along constructive lines and to promote industrial arbitration, and he used his influence to secure legislation favorable to the working people. It is worthy of note that he was almost the only labor leader of national influence in 1916 who advocated military preparedness for his country. During American participation in the World War, he heartily supported the government, and exerted his influence against strikes. Late in 1924, he went to Mexico City after attending a convention in El Paso, Tex. On being taken seriously ill, he asked to be taken home that he might die on American soil. While en route, he died in San Antonio, Tex., on December 13.

**A Summary.** Among the laws Gompers framed, supported, or originated were the eight-hour law for government employees; the various state laws fixing hours of labor; laws establishing Labor Day as the workingmen's holiday; the Federal workingmen's compensation law; the law limiting the use of injunctions in labor disputes; the law exempting labor unions from prosecution as combinations in restraint of trade; and the law regulating punishment for contempt of court. He was also directly responsible for the legislation which created the Department of Labor as a separate department of the Federal government, with a Cabinet member at its head.

Throughout his career, with one exception, Mr. Gompers refused to become identified with any political party, taking the position that he could be of more service to the cause of labor by holding himself aloof from identification with any single political organization. In 1924 he endeavored to pledge the American Federation of Labor to the candidacy of Robert M. La Follette, Progressive nominee for President, but notwithstanding his great influence, labor voted independently.

**GONADS**, *gon' adz*. See CHILDHOOD, BEHAVIOR IN.

**GONAIVES**, *go nah eevz'*, BAY OF. See HAITI.

**GONCHAROV**, *gahn chah rawf'*, IVAN. See RUSSIAN LITERATURE.

**GONDOLA**, *gahn' do lah*. The silent-moving boat, floating along the canals of the city of romance, has long been a subject for painters and poets. Picturesque, indeed, is the gondola, constructed as it is to conform to the spirit and the ideas of medieval times. Typically long and slender (usually about thirty by four feet), and flat-bottomed, the gondola flaunts a gay-colored, curtained shelter for passengers, and a high, sharp-pointed prow and stern, often mounted with carved pieces of iron or wood, designed after emblems of ancient Rome. In accordance with an old law passed to prevent extravagance and competition in decoration of gondolas, all are painted black, except those of high officials. Usually there

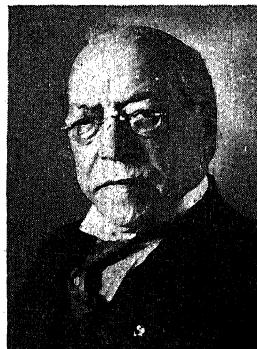


Photo: U &amp; U

SAMUEL GOMPERS



A VENETIAN GONDOLA

Many of these boats are equipped with canopies.

is but one boatman, called a *gondolier*, who stands facing the bow and who propels the boat quickly and deftly with a vigorous stroke of a long pole.

This picturesque means of conveyance is now being replaced to a large extent in Venice by noisy little gasoline launches. However, gondolas will not disappear, because of their romantic appeal to tourists. See VENICE.

**GONDS**, hill tribes of India. See INDIA (The People).

**GONSALVO DE CORDOVA**, *gohn sahl' vo day kohr' doh vah*, GONZALO HERNANDEZ Y AGUILAR (?1453-1515), a Spanish general called the *Great Captain*, was born at Montilla. He rendered distinguished service in the war of Queen Isabella against Portugal and in the conflict which drove the Moors out of Europe, and was instrumental in bringing about the union of Granada and Castile in 1492. In 1495 he united with Ferdinand, king of Naples, against the French, and in a few months succeeded in vanquishing them. In 1500, when Ferdinand of Aragon and Louis XII of France decided on the conquest of Naples, Gonsalvo led the invading Spaniards and took possession of the kingdom. The conquerors soon quarreled over the division of the booty, and war was declared between them in 1502. Gonsalvo vanquished the French at Cerignola in 1503 and took several important cities. He sustained the single defeat of his life at Gaeta, but ultimately drove the French from Naples. Ferdinand then appointed him viceroy of Naples, with absolute authority. He was soon recalled

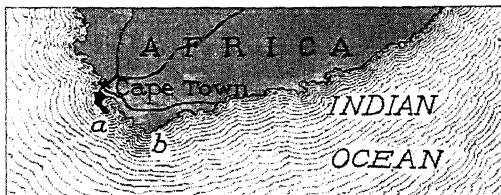
to Spain by the king, who resented his general's growing popularity, and his last years were spent in retirement.

**GOOBER**, a popular name applied to the peanut (which see).

**GOOD FRIDAY**, the anniversary established by religious bodies as a memorial of the crucifixion of Christ. It is solemnized on the Friday before Easter by churches of many denominations and by various schools and public institutions. Its commemoration is of ancient origin, dating to the time of Constantine, who prohibited all public activities on this day. It is still a legal holiday in Great Britain and Ireland and the British colonies. In the Roman Catholic Church, the mass on Good Friday is different from that read on other days, the Host having been consecrated on the previous day. In the Anglican and Roman Catholic Churches, the Three Hours' Devotion service is held between twelve and three o'clock, in commemoration of the agony of Christ upon the cross during those hours. In accordance with the calculations of the Royal Astronomical Society of Berlin, a German scientist has fixed the exact date of the Crucifixion as April 6, A.D. 33.

**GOOD HOPE**, a cape near the southern extremity of Africa, at the termination of a small peninsula extending south from Table Mountain, which overlooks Cape Town. The cape, locally known as Cape Point, or "the Point," forms the west side of False Bay, and on its inner or eastern coast are Simon's Bay and Simon's Town, where there is a safe anchorage

and a British naval station. Bartholomeu Dias, a Portuguese, who discovered the cape in 1487, called it *Cape of Storms*, but John II of Portu-



CAPE OF GOOD HOPE

(a) Cape of Good Hope. The most southerly point of the continent is (b) Cape Agulhas.

gal changed this to its present name, as its discovery aroused a hope of finding a sea route to India. This hope was verified by Vasco da Gama in 1497, when he sailed around the Cape of Good Hope and found his way to Calicut, on the west coast of India.

The Cape of Good Hope is not the most southerly point of Africa. That distinction belongs to Cape Agulhas, about 100 miles to the southeast. See GAMA, VASCO DA.

**GOODING COLLEGE.** See IDAHO (Education).

**GOOD QUEEN BESS.** See ELIZABETH.

**GOOD ROADS MOVEMENT**, the name identified with the attempt to secure better roads throughout the United States and Canada. For details, see ROADS AND STREETS (The Good Roads Movement).

**GOODS AND CHATTELS.** See CHATTEL.

**GOODSPEED**, EDGAR JOHNSON (1871-), an American Biblical scholar, most widely known for his translation of the New Testament into conversational English. Dr. Goodspeed was born at Quincy, Ill., and educated at Denison University (Ohio), at Yale, the University of Chicago, and the University of Berlin. After a varied career as a teacher, he became, in 1923, head of the New Testament department at the University of Chicago. He holds the title, professor of Biblical and Patristic Greek.

Dr. Goodspeed devoted three years of intensive work to the preparation of his New Testament, which was published in 1923 [see BIBLE (Accepted English Versions)]. A good example of the modern style used by the



DR. GOODSPREAD

translator is shown in the following passage (*I Corinthians, XIII*):

If I can speak the language of men and even of angels, but have no love, I am only a noisy gong or a clashing cymbal. If I am inspired to preach and know all the secret truths and possess all knowledge, and if I have such perfect faith that I can move mountains, but have no love, I am nothing. Even if I give away everything I own, and give myself up, but do it in pride, not love, it does me no good. Love is patient and kind. Love is not envious or boastful. It does not put on airs. It is not rude. It does not insist on its rights. It does not become angry. It is not resentful. It is not happy over injustice, it is only happy with truth. It will bear anything, believe anything, hope for anything, endure anything. Love will never die out. If there is inspired preaching, it will pass away. If there is ecstatic speaking, it will cease. If there is knowledge, it will pass away. For our knowledge is imperfect and our preaching is imperfect. But when perfection comes, what is imperfect will pass away. When I was a child I talked like a child, I thought like a child, I reasoned like a child. When I became a man I put aside my childish ways. For now we are looking at a dim reflection in a mirror, but then we shall see face to face. Now my knowledge is imperfect, but then I shall know as fully as God knows me. So faith, hope, and love endure. These are the great three, and the greatest of them is love.

**Other Writings and Edited Works.** These include Greek *Papyri* from the Cairo Museum, *Ancient Sermons for Modern Times*, *Homeric Vocabularies*, *Index Patristicus*, *Tebtunis Papyri*, *The Conflict of Severus*, *The Epistle to the Hebrews*, *The Story of the New Testament*, *Harmony of the Synoptic Gospels* (in coöperation with Prof. E. D. Burton), *The Formation of the New Testament*, and *New Solution of New Testament Problems*.

**GOOD TEMPLARS, INTERNATIONAL ORDER OF**, a fraternal society organized at Fayetteville, N. Y., in 1851, having for its object individual total abstinence and world-wide prohibition of the liquor traffic. The order was introduced into England in 1868 and soon spread throughout the civilized world, its code being translated into eighteen different languages. The question of the admission of negroes caused a division in 1874; a section of the society was then organized under the name of the Right Worthy Grand Lodge of the World. In 1887 the two branches were re-united.

Through the National Prohibition party, formed in 1869 by a committee appointed by the Right Worthy Grand Lodge, the order became primarily responsible for putting the temperance question into politics; and the Woman's Christian Temperance Union was organized in 1874 by Good Templar women. The Washingtonian Home for Inebriates at Chicago, Ill., and the orphans' home at Vallejo, Calif., were founded by this order. The organization comprises two national grand lodges (United States and Canada). See PROHIBITION PARTY.

**GOOD WILL**, the advantage acquired by a business concern beyond the valuation of its capital, property, stock, or funds. The existence of good will in a business is measured by the excess of the net profits of the business over the normal average rate of return on the money invested. Thus, if the net profits of a business for three years were \$15,000, \$19,000, and \$20,000, respectively, and the normal average return on the investment would have been \$10,000, the seller could ask \$80,000 for the good will of the business. He would have figured this somewhat as follows: his average profits for three years are \$18,000, the normal \$10,000, so he has an average excess of \$8,000 profits. Capitalizing this on a ten per cent basis would give a valuation of \$80,000 to the cause for these excess earnings. When a person buys a business and pays for good will, he may insist on an agreement which among other things states that he may represent himself as the successor of the old firm, that the former proprietor will not engage in the same line of business within a reasonable time, and that the latter will assist in making the new business successful in every way. F.H.E.

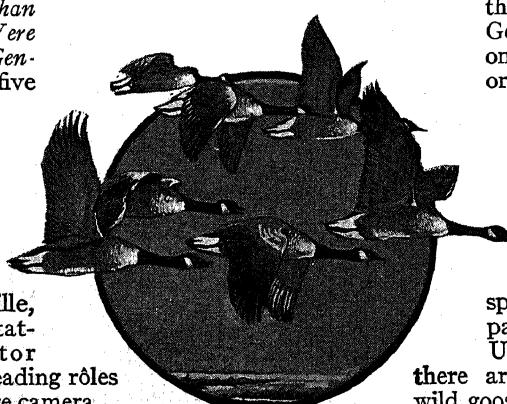
**GOOD WILL.** See CHARACTER TRAINING (Duties Owed to Others).

**GOODWIN, NATHANIEL CARL** (1857-1919), an American actor who attained a large measure of success in comedy rôles. He was born in Boston, and made his first appearance in a play entitled *Law in New York*. His second success, *Black-Eyed Susan*, established his reputation as a comedian of the "legitimate" type. Among the other plays in which he assumed leading parts were *A Gold Mine*, *A Gilded Fool*, *Nathan Hale*, *When We Were Twenty-One*, and *The Genius*. He was married five times, his second wife being Maxine Elliott, a popular actress; his last union was with Miss Edna Goodrich, also an actress. His first wife died; the others divorced him. He appeared in vaudeville, telling stories and imitating some of his actor friends; he also played leading rôles before the moving-picture camera.



Photo: Brown Bros.

"NAT" GOODWIN



**GOODYEAR, CHARLES** (1800-1860), an American whose genius made possible the development of the rubber industry. Imagine a rubber coat which in winter was so stiff that it would stand unaided, but on a hot summer's day became soft and sticky, and if stretched would remain out of shape! Daniel Webster, who was Goodyear's lawyer in his patent suits, had such a coat, and if Goodyear had not spent all his spare time and money for years in trying to make good rubber, our coats and overshoes to-day might be like the coat of Webster, and automobile tires such as we now have would be unknown.

The discovery which this tireless investigator made was that rubber mixed with sulphur and heated to the melting point is no longer subject to changes of weather. He learned this fact in 1839, after nine years or more of persistent effort in the face of poverty. It was another five years before his process was perfected and could be patented, and then came year after year of lawsuits to protect the patents—suits so expensive that he was never out of debt.

Goodyear was born in New Haven, Conn., though his boyhood was spent in Naugatuck. He became an iron manufacturer in Philadelphia, entering into a partnership with his father, which in 1830 ended in failure. He then turned his attention to rubber, with the result described above. See RUBBER; PNEUMATIC TIRES.

**GOOSE**, a web-footed bird closely allied to the swan and duck, and in size ranging between the two. Its neck is longer than that of the duck, but shorter and less gracefully curved than that of the swan. Geese are more at home on land than either swans or ducks, as their legs are longer and placed nearer the middle of the body. Geese are long-lived; in some cases, individuals have reached the age of fifty years.

There are about forty species found in different parts of the world. In the United States and Canada, there are ten or twelve species of wild goose. These are migratory,

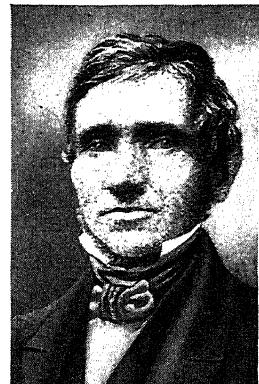
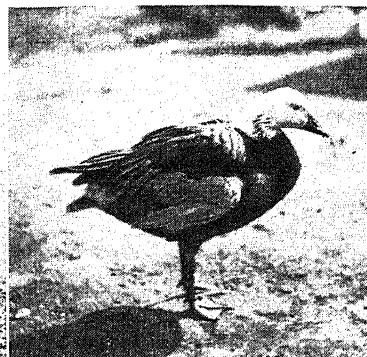
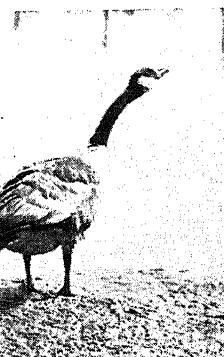
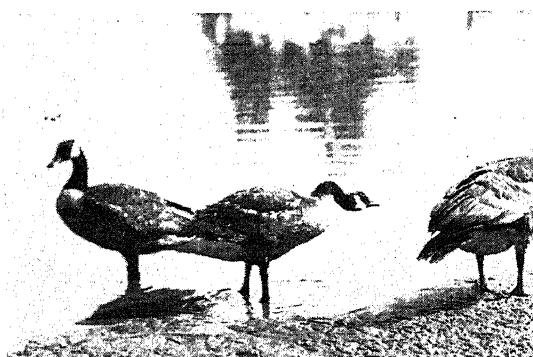


Photo: Brown Bros.

CHARLES GOODYEAR



Photos: Visual Education Service

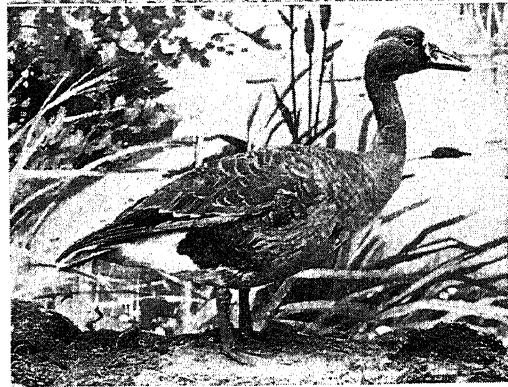
#### THREE VARIETIES OF GEESE

Upper left, Canada geese; right, blue goose. Below, white-fronted goose.

made. The food value of goose is high, the percentage of fat and protein being more than that of beef. In fact, the richness of goose meat prevents its being more than an occasional dish on American tables. The domestic breeds of greatest economic importance are the gray *Toulouse*, the white *Emden*, and the gray *African*.

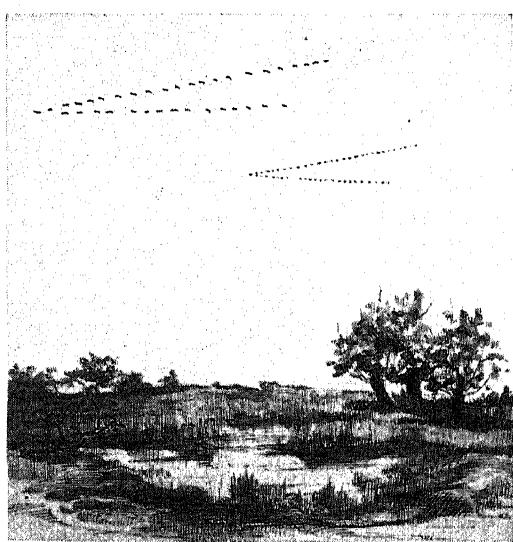
D.L.

**In History and Literature.** The story of the sacred geese that saved the city of Rome is one of the most interesting narratives of early Roman history. In 390 B.C. the Romans were attacked by the Gauls, a fierce northern race of people. Finally driven to their



and early in the spring they fly in wedge-shaped flocks to the northern breeding grounds, as far as the shores of Hudson Bay. The winter haunts are the Southern United States and Cuba. When on the wing, they utter curious honking cries. A gander (adult male goose) usually leads the migrating flock. Most geese are vegetable-feeders, searching for food on land, frequenting the water less than ducks, but often enjoying plants growing in shallow lakes. The Canada goose (which see) is the most numerous of the American species; occasionally, when migrating, it is seen in flocks of thousands, honking loudly enough to be heard at a distance of several miles. See, also, BRANT GOOSE.

**Domestic Geese.** These are descended from the graylag goose of Europe. By careful breeding, domestic geese have been developed to much greater size and productivity than their progenitor possesses. The raising of geese is relatively of greater importance in Europe than in America, though the United States census reports show that the goose ranks next to the turkey in number of birds raised on farms. In Europe, more especially in Germany, goose flocks of considerable size are kept by the peasants and often are a valuable source of the family income. Geese are raised for their flesh, feathers, quills, and eggs. From the livers of fattened geese the delicately flavored paste known as *pâté de foie gras* is



WEDGE-SHAPED FORMATION

The appearance of geese on the wing when migrating.

last place of refuge, a steep, rocky hill known as the Capitol, they prepared to withstand a long siege. One night, as the Consul Manlius lay sleeping beside his sword, near the Temple of Juno, where were kept the sacred geese, he was awakened by a clamorous outburst of hissing and cackling. Grasping his sword,

Manlius rushed to the walls of the fortress and discovered that his foes had climbed the steep rock and were about to storm the place. Then the other Romans, awakened by the clamor of the frightened birds, hurried from their sleeping places to the spot where the brave consul was defending the walls, and in the battle which followed, completely routed the Gauls.

One of the familiar fables is the story of a goose that laid each day a golden egg. How its greedy master killed it and cut it open, hoping to find in its body untold wealth, and found nothing, is often told to impress the lesson that greediness never wins us anything.

**Scientific Names.** Geese constitute the subfamily *Anserinae* in the family *Anatidae*. The graylag is *Anser anser*; the Canada goose, *Branta canadensis*.

**GOOSEBERRY**, an extensively cultivated oval berry, popular for jelly, jam, marmalade, and pies. It belongs to the same genus as the currant and requires practically the same conditions and care. In color it may be white, yellow, green, or red, and it may be prickly, hairy, or smooth.

The shrub which bears gooseberries is sturdy, and upright, with very spiny branches, deeply lobed leaves, and greenish-yellow flowers. Cultivated varieties are derived from both European and native American species. The former are larger and better-

flavored, but the American gooseberries are harder and less subject to mildew. Gooseberries thrive in cool, moist climates and are partial to shade. It is not difficult to raise the bushes in the home garden under fruit trees. Nevertheless, in spite of its distinctive flavor and adaptability to cooking and canning, the gooseberry is not generally popular, and is not likely to attain an important place among American commercial fruits. The chief regions of production in the United States are the North Central, Middle Atlantic, Rocky Mountain, and Pacific states. In England the gooseberry is highly esteemed, and improved varieties yield berries as large as plums.

Gooseberries are propagated by suckers, cuttings, and layers. They require a cool, well-drained, fertile soil of some such heavy type as clay loam. Nursery plants are usually set out four to six feet apart in rows that are six feet apart. It is important to have the soil about the roots very firm. Fruits for canning or jelly are picked before they ripen. Though still somewhat tart, the fully ripe berries are very palatable, and may be eaten fresh with sugar as dessert.

B.M.D.



Photo: St. Clair  
GOOSEBERRY

Gooseberries belong to the saxifrage family, *Saxifragaceae*, and to the genus *Ribes*.

**GOOSEFOOT, OR CHENOPODIUM, ke'no po' di um.** The first of these terms is the common name, the second the scientific name of a genus of weedy herbs widely distributed in temperate regions. They bear clusters of small greenish flowers. The succulent leaves of some of the species have been used as greens in place of spinach. In America, the species known variously as *pigweed*, *lamb's-quarters*, and *goosefoot* occurs as a weed that is troublesome because its seeds, which are produced in countless numbers, become mixed with grain and grass seed. The plant is an annual and can be kept under control if cut down before the seeds ripen.

Another species, with a strong aromatic odor, is used as a substitute for tea in Mexico. In the American states east of the Mississippi and in the Southwest, a variety of this species, known as *wormseed*, grows commonly as a weed, but is valued for its seeds, which yield an oil used to expel intestinal worms. In large doses, wormseed oil is highly poisonous.

B.M.D.

**Scientific Names.** The genus belongs to the family *Chenopodiaceae*, the family furnishing beets and spinach. Lamb's-quarters is *Chenopodium album*. Wormseed is *C. ambrosioides*, var. *anthelminticum*.

**GOPHER, go' fur.** In the pioneer days of North America, the early French settlers gave



THE GOPHER

the name *gopher* to the numerous little rodents whose burrows honeycombed the soil. The

word is a corruption of *gaufre*, meaning *honey-comb*. Gophers have fur-lined pouches in the sides of their cheeks, and naturalists call them *pocket gophers* and *pouched rats*. The various species have a wide range from Illinois, Florida, and the Gulf of Mexico westward to the Pacific coast, and from the Saskatchewan River district south to Panama. In the Southeastern states, they are known as *salamanders*.

The species vary somewhat in size, being comparable to mice and rats in weight, but gophers are singularly alike in shape of body. One can easily be recognized by its broad, blunt head with practically no neck, rudimentary external ears, short, hairless tail, short legs, and small eyes. The color is ordinarily a reddish-brown. Gophers carry their food of grass, roots, nuts, buds, and farm vegetables in their cheek pouches, and also use them to convey dirt from their burrows. In digging, they use the large, strong claws of their front feet, and their overhanging incisor teeth. They have poor eyesight and are not agile enough to escape easily when pursued; hence they are not often seen in daytime, but their presence is made known by the little mounds of earth along the course of their tunnels.

In the Western plains is found a small striped rodent related to the chipmunks. This animal is called *striped gopher* and *prairie squirrel*; it belongs to a different family. W.N.H.

**Scientific Name.** True gophers belong to the family *Geomyidae*. The most common species is *Geomys bursarius*.

**GOPHER STATE**, one of the popular names applied to Minnesota (which see).

**GORDIACEA**, *gawr de a' she ah*. See ZOOLOGY (Divisions of the Animal World).

**GORDIAN KNOT**, *gavr' di an not*, in ancient mythology, the skilfully tied knot with which the Phrygian peasant, Gordius, fastened his yoke and cart. According to the legend, this peasant, through the intervention of the gods, was made king of Phrygia. Gordius then dedicated his cart and yoke to Zeus, and oracles foretold that whoever should unloose the complicated knot would be ruler of all Asia. After many unsuccessful attempts of others, Alexander the Great came to Gordium, a city in Phrygia named for Gordius, and cut the knot with his sword, asserting that by so doing he had fulfilled the prophecy. From that originated the expression *cutting the Gordian knot*, meaning to solve a difficult problem with unexpected cleverness.

Gordius was the father of the famous Midas (which see), whose touch turned everything to gold.

[The genus of hairworms (see HAIRWORM) is known as *Gordius* because these creatures are often found tangled together in knots.]

**GORDIUS.** See GORDIAN KNOT.

**GORDON**, CHARLES GEORGE (1833-1885), an English soldier, called CHINESE GORDON and GORDON PASHA because of illustrious service in China and Egypt. He was born at Woolwich, and was graduated at the Royal Military Academy at Woolwich in 1852. Gordon saw active service in the Crimean War. He took part in the expedition to China in 1860, assisted in the capture of Peking, and commanded the Chinese force which suppressed the Taiping rebels. In 1873 he was appointed governor of the Sudan, resigning his post in 1880, after his failure to arrange a treaty between Egypt and Abyssinia. In 1884 he was again sent by his government to the Sudan to assist the khedive in withdrawing the garrisons of the country. He made a gallant defense of Khartum, and was killed two days before the arrival of the relief party under Lord Wolseley. See EGYPT (History).

**GORDON**, CHARLES WILLIAM (1860- ). Under the pen name RALPH CONNOR, this noted Presbyterian clergyman has become widely known for his stories of the Canadian Northwest. He is the son of a Scottish Presbyterian minister who moved to Canada in the early "forties" and settled in a forest section of the county of Glengarry, Ont. There the author was born. He entered the University of Toronto, and after his graduation, studied theology for three years at Knox College, Toronto. In 1890 he was ordained to the Presbyterian ministry, and the same year began a three years' sojourn as a missionary among the miners and lumbermen of the Canadian Northwest Territories. In 1894 he was appointed pastor of Saint Stephen's Presbyterian Church, Winnipeg.

Many honors have come to him, including election to the vice-presidency of the Canadian Society of Authors, and to a fellowship in the Royal Society of Canada.



Photo: Brown Bros.  
"CHINESE GORDON"



Photo: Brown Bros.  
"RALPH CONNOR"

**Leading Books.** "Ralph Connor's" deep sympathy with the people among whom he has worked, his understanding of their problems, and his penetration into human nature are revealed strikingly in such stories as *Black Rock*, *The Sky Pilot*, *The Man from Glengarry*, *Glengarry School Days*, *The Prospector*, and *The Doctor*. Among other books are *Corporal Cameron of the Northwest Mounted Police*, and its sequel, *The Patrol of the Sun Dance Trail*; *The Major*; *Treading the Wine Press*; *The Angel and the Star* (sermons); *The Life of the Late Rev. Dr. James Robertson*; and *The Dawn by Galilee*.

**GORDON, JOHN BROWN** (1832-1904), an American soldier, statesman, lecturer on war subjects, and author of *Reminiscences of the Civil War*, was born in Upson County, Ga. After his graduation from the state university in 1852, he took up the practice of law. With the outbreak of the War of Secession, he organized the "Raccoon Roughs," a band of men from Raccoon Mountain, Alabama, where he had mining interests, and entered the Confederate army as captain of infantry, later being promoted to lieutenant general. He commanded one wing of Lee's army at the surrender of Appomattox Court House. Gordon was elected to the United States Senate in 1873, 1879, and 1891. From 1887 to 1890 he was governor of Georgia, and for many years was commander in chief of the United Confederate Veterans' Association.

**GORDON PASHA.** See GORDON, CHARLES GEORGE.

**GORGAS, gawr' gahs**, WILLIAM CRAWFORD (1854-1920). Known during his life as the only high officer in the United States army who fought all the time, Dr. Gorgas did not contend against hostile regiments, but battled with disease-breeding insect enemies. He was surgeon general in the United States army, with the rank of major general; and to him is due almost entire credit for the sanitary condition of the Panama Canal Zone.

He was born at Mobile, Ala., studied at Bellevue Hospital Medical College in New York City, in 1880 was appointed surgeon in the army, and in 1898 was made chief sanitary officer in Havana, at the time of the occupation of Cuba by the United States army after the Spanish-American War. In that post he applied methods which practically eliminated yellow fever from the island. In 1903 he was raised to the rank of colonel, in recognition of his work in Havana, and in the next year was

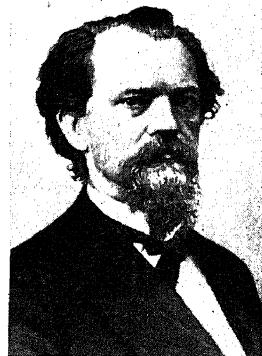


Photo: Brown Bros.  
JOHN B. GORDON

appointed chief sanitary officer of the Panama Canal Commission.

The Canal Zone was possibly the most unhealthful and unsanitary spot in the two Americas where white men were forced to live, and Gorgas' work of improvement had to begin with fundamentals. Disease-breeding filth was cleaned up, marshes were drained, houses were screened against the infection-carrying mosquito, and within an incredibly short time the Zone was transformed from a deadly section into an area where men might live and work without danger to their health. Gorgas thus had a part in the construction of the canal comparing favorably with that taken by the great engineer, Goethals, for American engineering ability would have failed to accomplish the undertaking had it not been for Gorgas and his assistants.

In 1914 Gorgas was called to South Africa by the Chamber of Mines of Johannesburg, to investigate sanitary conditions in the Witwatersrand mines. He was a permanent director of the International Health Commission of the Rockefeller Foundation (which see). His death, following a stroke of apoplexy, was the result of his tireless efforts in his chosen field. See PANAMA CANAL (How the Canal Was Built); MOSQUITO.

**GORGONS**, three frightful beings of Greek mythology, daughters of the sea-god Phorcys; of them it was said, "their glance was icy death," turning to stone all who looked upon them. The two older ones were immortal, but Medusa, the one best known, was mortal and met her death at the hands of Perseus. The hair of the Gorgons was a mass of serpents, their hands and teeth were of brass, and their bodies were covered with scales which could not be pierced. The name is from a Greek word meaning grim, and is often used to signify anything very hideous. See MEDUSA.

**GORILLA, go ril' ah**, the largest and rarest of the anthropoid, or manlike, apes, and the one closest to man psychologically. The male is usually larger than a man, and stands fully six feet in height when in an upright position. The gorilla is a native of the forests of Equatorial West Africa. There it has been hunted to the point of extermination, and to preserve it for scientific study, the Belgian government has set aside a gorilla sanctuary of 250 square miles in the Belgian Congo. Although the

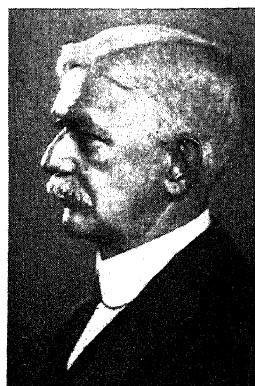
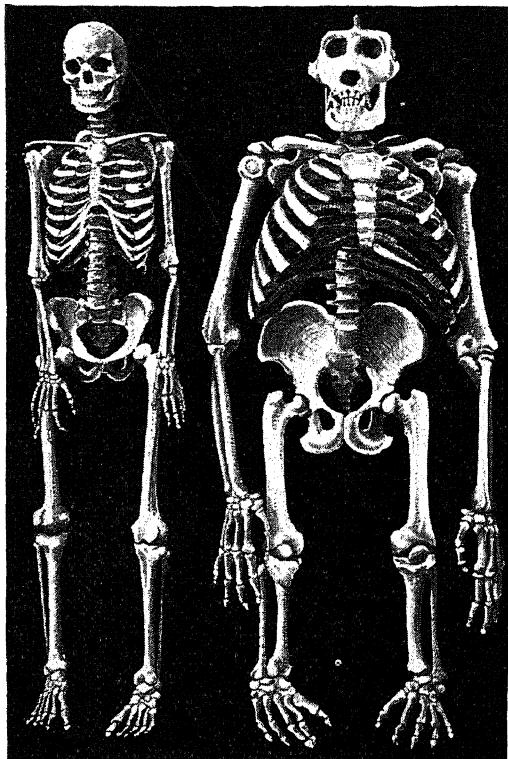


Photo: U & U  
MAJOR GENERAL GORGAS

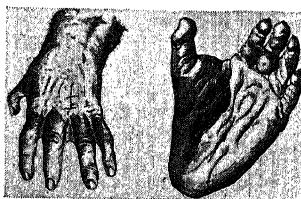
name is of ancient origin, our authentic knowledge of gorillas dates back only to about 1850. These interesting simians are not a species of chimpanzee, as was once supposed, but the two are closely related (see CHIMPANZEE). It is the chimpanzee, not the gorilla, that one



MAN AND THE GORILLA  
Comparison of skeletons.

sees in vaudeville and moving pictures, acting in a way that seems almost human.

The gorilla is a huge, ungainly animal, with short legs and very long arms, the tips of the fingers reaching well below the knees. It is covered with a coat of coarse, matted, brownish hair, which becomes gray with age. The strength of the animal is in proportion to its size, and it could with ease tear a man limb from limb. The long canine teeth and lowering brows give an appearance of great ferocity to the



THE GORILLA  
Hand and foot.

male, which is belied by its somewhat timid habits. Only when it is shot at does the gorilla show a fierce disposition. As a rule, the

gorilla walks on all fours, but it occasionally rises upright and walks more naturally in that position than any other of the apes. Gorillas are not tree-dwellers. They seem to spend much of their time on the ground, and by day they roam the forests in family parties, searching for food. At night they make sleeping places for the females and young by lacing boughs of trees together and covering them with branches and leaves. It has been said that when the gorilla marries, he "cuts out night life, the clubs, and everything of the kind."

The food consists of fruit, nuts, honey, and eggs, and though a gorilla will not kill any animal for the sake of its flesh, it will eat meat if it can get it. The chief enemy of the gorilla—the only one it fears—is the leopard; all other inhabitants of the forest are terrified by its loud, hoarse challenge. It will always flee from man in great fright, but if wounded or cornered, it will make a terrific fight, rending and tearing with teeth and claws. Several captured specimens have been sent to Europe and America, but even with the greatest care, they can not be kept alive for more than a few years. See APE.

M.J.H.

**Scientific Name.** Gorillas belong to the family *Simiidae*. The scientific name of the typical species is *Gorilla gorilla*. Some naturalists recognize other species.

**GORKI, gor' ke** (also spelled GORKY), MAXIM (1860- ), famous Russian novelist, fearless champion of the downtrodden and oppressed, an exile by order of the czar, and one of the leaders of the revolutionary and socialistic forces in modern Russia.

Gorki's real name is ALEXIS MAXIMOVITCH PESHKOV; "Gorki," which means bitter, is a fictitious name which he chose at the outset of his career and which has clung to him. Indeed, "bitter" is the word which tells the story of his childhood days. He was deserted by his mother, and his father died when he was four years of age—this was the condition which clouded his life's beginning. Utter misery, coupled with an irrepressible desire to wander, led him later to become a peddler in the streets, a gardener, cook, railroad porter, and clerk. But the privations of those days enabled him to study human nature at first hand.

His writings have attracted attention, not because of their great literary qualities, but

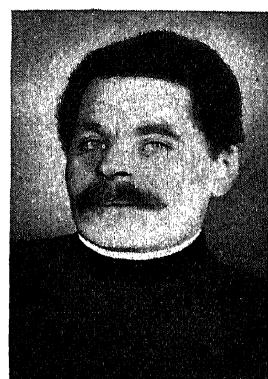


Photo: Brown Bros.

MAXIM GORKI

for their social significance. He takes his readers to the haunts of thieves, paupers, and lepers, and without fear or favor, shows the hearts of the forlorn and fallen. His characters are rebels and outcasts, with very stormy careers. Gorki's novels are not well sustained; the short stories form the best of his early work.

In February, 1915, the czar lifted the ban which had kept Gorki out of Russia for many years; since 1922 he has made his home in Germany. For pathos, picturesqueness, and daring struggle, the career of Gorki is perhaps unequalled among the writers of the twentieth century.

**What He Wrote.** Among his early books are *Foma Gordyeff*, *The Outcasts*, and *Three Men*. He also wrote several dramas, among them *The Lower Depths*. His later biographical writings, *Childhood*, *In the World*, *Fragments from a Diary*, and *Reminiscences of Tolstoi*, are his best work. *Decadence*, a story, appeared in America in translated form in 1927.

**GORRIE, JOHN F.** (1803-1855), an American physician, famed as the inventor of the ice machine and mechanical refrigeration. The device was invented not in the interest of the manufacture of ice for commercial purposes, but to lower the temperature in the rooms of fever patients. The state of Florida presented a marble statue of Dr. Gorrie to Statuary Hall, Washington, D. C., in 1914. In so doing, it established an innovation in that it selected as its representative in the memorial hall a citizen whose record was one of great service to humanity instead of a man of political achievement. His native city, Apalachicola, Fla., erected a monument in his memory there in 1900. See STATUARY HALL.

**GOSHAWK**, meaning *goose hawk*, is the name of a species of falcon common to Europe, Asia, and the north of Africa. It is rare in Great Britain, however, particularly in England. The goshawk, so named because it was first observed to fly at geese, was found to be easily tamed, and came into use for falconry. The female, which is much larger than the male, is flown at hares, rabbits, and the larger game, and the male at the smaller birds, such as partridges. The *American goshawk*, commonly called *hen hawk*, or *chicken hawk*, is a larger bird of handsome bluish-gray plumage, found in the more northerly regions of North America. It is a destructive enemy, not only of small rodents, but of domestic poultry and smaller birds. See FALCON (Falconry); HAWK. D.L.

**Scientific Names.** The goshawks belong to the family *Falconidae*. The Old World goshawk is *Astur palumbarius*; the American, *A. atricapillus*.

**GOSHEN**, *go' shen*, in Biblical times a district or province in Egypt, adapted to raising flocks and herds, which was assigned by

Joseph to his father Jacob and family when they entered the country to escape famine in their own land (*Genesis XLVII*). It was located



Photo: U & U

THE GOSHAWK

on the eastern border of the Nile delta, a few miles to the northwest of On, and many of the Israelites lived there up to the time they were enslaved by the Egyptians. See JOSEPH.

**GOSHEN, IND.** See INDIANA (back of map).

**GOSNOLD**, *gos' nuld*, BARTHOLOMEW (?-1607), an English navigator and explorer who, in 1606, was instrumental in securing the grants of American charters to the London and Plymouth companies. In 1602 he explored the coast of New England from Maine to Buzzard's Bay, returning to London with a valuable cargo of furs and woods, which he had secured from the Indians in trade. He was in command of one of the three vessels which carried the first colonists to Jamestown, Va., in 1607, and was active in the affairs of the colonies. Soon after his arrival in America, death by fever ended his promising career.

**GOSPELS**, the first four books of the New Testament, in which the life and teachings of Christ are described by the men whose names the books bear; that is, Matthew, Mark, Luke, and John (see biographies of the four, in the article APOSTLES). The first three books have much in common, as they take Christ's ministry in Galilee for their main theme and say very little concerning His divinity, while John

presents Jesus as the Divine Savior of mankind. None of the gospels aims at giving a complete biography of Christ, but each is a collection of His deeds and words for doctrinal instruction. However, Christ's betrayal, arrest, trial, crucifixion, and resurrection are so important that they are described by all. Matthew and John were Apostles, and saw all the events which they recorded, while the other two learned their facts from eyewitnesses of the scenes. See *BIBLE*.

The *Gospel of Matthew*, written from the Jewish point of view, presents Jesus as the royal Messiah, who came as the fulfilment of the law and prophecy of the Old Testament to establish the true kingdom of God in the world. The author describes Christ's teachings and the miracles which He worked, as well as the useless opposition of the Pharisees, to show that God's kingdom was meant to embrace not only Jews but all nations.

The *Gospel of Mark*, the shortest of the four, was written by a Gentile to the Romans, and is full of action and power. In it the author represents mainly Christ's ability to save, as shown in His miracles. Its narrative consists of a series of scenes described in the order in which they occurred, with more stress laid on the deeds than on the teachings of Christ. Ancient tradition tells us that Mark's gospel presents much of Peter's preaching concerning Christ.

The *Gospel of Luke* was written for Jew and Gentile alike, and so is broader than the first two. The author was especially fond of exhibiting Christ's favor to the fallen, the outcast, and the poor. This gospel presents Christ as establishing a religion to uplift and save suffering humanity. Luke says that he bases his knowledge for the book on evidence from "eyewitnesses . . . of the word," that is, the Apostles.

The *Gospel of John* tells more of Christ's labors in Judea, and differs greatly from the other three by proclaiming the divinity of Christ and showing that the human Jesus is the eternal Son of God. Christ's teachings and works are described to show how He brings eternal life to those who receive Him. John thus presents the mission of Jesus as the climax of God's self-revelation.

**GOSSAMER**, a light, filmy substance, consisting of the webs produced from a sticky fluid ejected with great force by small spiders, and only, according to some authorities, when they are young. On clear days, particularly in the autumn, threads of gossamer may be seen in fields of stubble, on low bushes, and floating through the air. The single strands are so delicate as to be almost invisible, but when blown about by the wind, they unite and form thicker threads. The name is also applied to a variety of gauze formerly much used for

ladies' veils. It is very delicate in texture, yet strong.

**GOSSE**, *gos*, EDMUND WILLIAM (1849-1928), an English poet, student, and critic of literature. He was born in London, and was translator to the London Board of Trade from 1875 until 1904, when he became librarian of the House of Lords. In 1917 he was made chairman of the board of Scandinavian studies at University College in London, and in 1921 became president of the English Association. He specialized in the study of Scandinavian literature, and published a volume of *Studies in the Literature of Northern Europe*. His poetry, contained in *Madrigals, Songs and Sonnets*, *On Viol and Flute*, *In Russet and Silver*, and other collections, is graceful and musical.

Notable among his other works are *From Shakespeare to Pope; An Inquiry into the Causes of the Rise of Classical Poetry in England*, *History of Eighteenth Century Literature*; *History of Modern English Literature*; *Diversions of a Man of Letters*; *Aspects and Impressions*; and *Silhouettes*.

**GOTAMA**, a variant of Gautama. See *BUDDHISM*.

**GÖTA**, *gu' tah*, RIVER. See *SWEDEN* (Rivers and Lakes).

**GOTHAM**, *goth' am*, or *got' am*, a name applied somewhat derisively to New York City by Washington Irving in 1807 in his book *Salmagundi*. As early as the fourteenth century, the "fools of Gotham" are mentioned in literature, the name being derived from a parish in England whose inhabitants were noted for their follies and their simplicity. According to the story, King John, on his way through the country, sent word to the Gothamites to prepare to entertain him. They pretended to be imbeciles to avoid the expense, and the king journeyed elsewhere. "As wise as the men of Gotham," signifying *worldly wisdom*, thereafter was a common saying. The name Gotham is still applied to New York City by newspaper writers.

**GOTHENBURG**, *got' en burg*, or **GÖTEBORG**, *yu teh bor' y'*. See *SWEDEN* (The Cities).

**GOTHIC**. This term means *pertaining to the Goths*, and also designates the Teutonic language of the Goths. In printing, it distinguishes a style of type with all lines of uniform thickness. In architecture, it denotes a style characterized by the pointed arch, and was at first applied derogatively to any style not classical Greek or Roman. See *ARCHITECTURE*.

**GOTHS**, a powerful Germanic tribe of ancient times, which was connected in an important way with the history of the Roman Empire. In the fourth century before the Christian Era, the Goths dwelt upon the shores of the Baltic Sea, but little is known

of them until early in the third century A.D., when they were settled about the mouths of the Danube River. There they grew rapidly in numbers and in strength, and by the middle of the century, had begun to invade the Roman province of Dacia. During many years of warfare, they held their own against the Roman armies sent to drive them back, and in 272 Dacia was ceded to them by the Emperor Aurelian. About a century later, they divided into the Ostrogoths (Goths of the East) and the Visigoths (Goths of the West), the former dwelling on the shores of the Black Sea, the latter inhabiting Dacia and the banks of the Danube River.

**The Visigoths.** In 395 a great army of Visigoths, led by the renowned King Alaric, invaded Greece and laid waste the Peloponnesus. Alaric ceased his depredations only when the governorship of Illyricum was promised him. In 410 he stormed and sacked Rome, and was preparing to lead his forces to Sicily when he died. Under his successors, a powerful Visigothic kingdom was established in Southern Gaul (the southern part of modern France) and Spain. In 507 Alaric II, king of the Visigoths, was defeated by the Frankish king, Clovis, and the territory of the Visigoths as far south as the Pyrenees Mountains was added to the kingdom of the Franks. The Visigothic kingdom in Spain endured until 711, when the last king, Roderick, was slain in a battle with the Moors.

**The Ostrogoths.** In the latter part of the fifth century, the Ostrogoths were given permission to settle in Pannonia, a Roman province between the Danube and the Save rivers. Theodoric, their most celebrated ruler, who became king in 476, invaded Italy in 488, and in 493 defeated and slew Odoacer, the barbarian chief who was then on the throne of Italy. Theodoric ruled the country with great vigor and ability until his death, in 526. For several years thereafter, the Ostrogoths were warred upon by the Eastern emperors, and about 554, broken and scattered, they disappeared from history as a separate nation. C.W.

**Related Subjects.** The reader is referred in these volumes to the following articles:

Alaric  
Clovis

Odoacer  
Theodoric

**GOTLAND ISLAND.** See SWEDEN (The Land).

**GOTTSCHALK,** *got' shahlk*, LOUIS MOREAU (1829-1869), an American musician, born in New Orleans, La. He was the first American pianist to become famous internationally. Gottschalk began to compose at the age of sixteen, and made successful concert tours in France, Switzerland, Spain, South America, and the United States. In these he played chiefly his own compositions and conducted

his orchestral works. He composed extensively for the piano, *The Last Hope* being considered his masterpiece. His works have an originality and charm which were greatly enhanced by the freshness and passion of his playing.

**GOUCHER COLLEGE.** See MARYLAND.

**GOUGH,** *gōf*, JOHN BARTHOLOMEW (1817-1886), a temperance orator of remarkable magnetism, who early in life was a drunkard. After terrific struggles, he won control of himself and became America's foremost temperance worker. Gough was born in England, but his parents moved to the United States when he was a child.

After the death of his mother, he was induced to sign a pledge, but there were many lapses. However, once master of himself, he never fell again. From that time on, he devoted his energies to the lecture platform in behalf of temperance. He was the leader of the red-ribbon movement; during its vogue, literally millions of people wore little red-ribbon badges as the visible token of a written pledge to abstain from alcoholic drink.

**Gough's Books.** He published a series of *Temperance Lectures* and *Temperance Addresses*, and a volume of sketches, *Sunlight and Shadow, or Gleanings from My Life Work*.

**GOUJON,** *gō zhōN'*, JEAN (1520?-1568?), the most distinguished sculptor produced by France in the sixteenth century. During most of his career he worked in collaboration with the famous architects of his day, and it is in the wonderful harmony between his sculptures and the architecture which they adorned that his fame as an artist consists.

Goujon worked with the architect Pierre Lescot, the celebrated architect of the Louvre, and among his famous productions are several bas-reliefs which he designed for the church of Saint Germain l'Auxerrois in Paris, and a wonderful series of fountains near the Cemetery of the Innocents. These fountains were later removed and arranged in a public square, where they still are known as the Fountain of the Innocents. Goujon executed many carvings for the Louvre.

In 1561 an attempt was made to turn out of royal employment all those who were suspected of Huguenot (Protestant) tendencies, among whom was Goujon. The supposition that he was killed in the Massacre of Saint Bartholomew has been disproved, and the consensus now is that he lived in Bologna, Italy, after 1563, dying there about 1568. (See illustration of his work, page 2880.)

**GOULD,** *gōld*, the name of an American family which won a position of commanding influence in business and finance. Its most famous member, Jay Gould, was a remarkable railroad financier. Two of his children, George Jay Gould and Helen Miller Gould Shepard,



TRITONS AND NEREIDS

A sculpture by Goujon, in stone; now in the Louvre, Paris. (SEE PAGE 2879.)

attained special prominence, one as a business man and capitalist, the other because of her generous and noble efforts to make the world better.

**Jay Gould** (1836-1892) was born in Roxbury, N. Y. He received an academy education, and at the age of sixteen began work in a hardware store. Four years later, he entered the tanning and lumber business, in 1857 became a bank director in the little town of Stroudsburg, Pa., and soon began to buy railroad stock. This stock he disposed of at a handsome profit after the financial panic of 1857, and with the money thus gained he purchased a controlling interest in the Rutland & Washington Railroad (between Troy, N. Y., and Rutland, Vt.).

In 1859 he removed to New York, where he entered upon a career that was destined to have far-reaching effects in the history of American railroads. He began by obtaining control of the Erie Railroad when it was in financial straits. By a similar method, that of depressing the value of the stock in the open market and then buying during the period of depression, he continually added to his railroad holdings until in 1880 he controlled 10,000 miles of road, nearly one-tenth the mileage of the entire country. Among the lines which came under his control were the Union Pacific, the Missouri Pacific, the Wabash, the Texas Pacific, and the Saint Louis & Northern.

The consolidation of the various competing telegraph lines into the Western Union Telegraph Company in 1881 was also due to his genius for engineering great enterprises. Probably the most spectacular of his financial moves occurred in 1869, when he and James Fisk attempted to "corner" the gold market. The result of this was the disastrous financial panic of September 24, whose place in history is known as "Black Friday" (which see). Gould's

fortune at his death was estimated to be \$72,000,000.

**George Jay Gould** (1864-1923), eldest son of Jay Gould, was born in New York City and was privately educated. At the age of twenty-one, he succeeded his father as partner in the banking house of W. E. Connor & Company of New York, and three years later entered the railroad service as president of the Little Rock & Fort Smith Railway. Under his able management, the Gould interests were extended until they embraced a total railroad mileage of more than 27,000, besides large holdings in other great corporations.

In 1893 he became president of the Saint Louis, Iron Mountain & Southern, of the International & Great Northern, and of the Missouri Pacific roads, and from 1892 to 1913 was at the head of the Manhattan Elevated Railway of New York City. Through his initiative, the Wabash, one of the Gould lines, became a transcontinental system, with Baltimore as its Atlantic port, and he also brought about a friendly alliance between the Gould and Rockefeller interests. In 1914 he lost control of the Wabash system and his power as a railroad magnate weakened. In 1886 he married Edith Kingdon, a prominent actress, and their life together was ideal. She died in 1921.

*Photo: Brown Bros.*

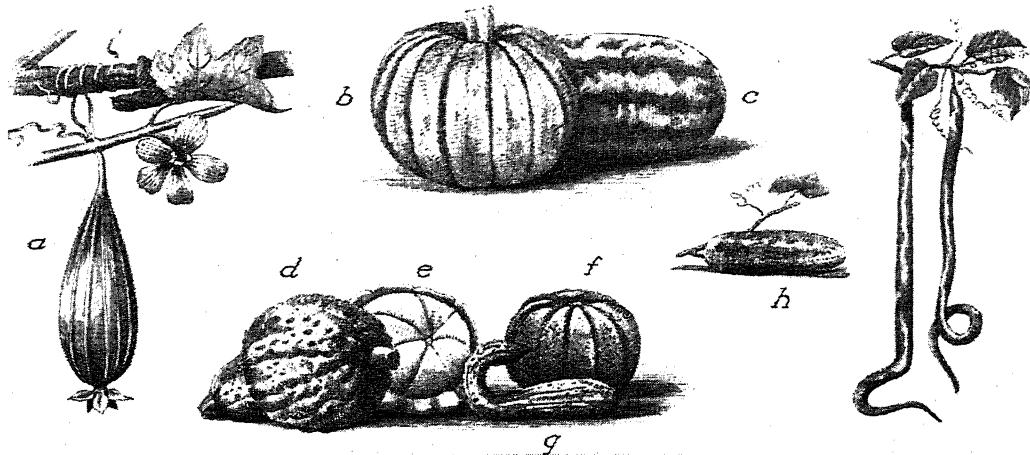
GEORGE J. GOULD

*Photo: Brown Bros.*

JAY GOULD



**Helen Miller Gould Shepard** (1868- ), who for years devoted the greater part of the fortune left her by her father to the welfare of humanity, is the eldest daughter of Jay Gould. She became interested in philanthropic work early in life. When the Spanish-American War broke out in 1898, she gave \$100,000 to the United States Government for sanitary and hospital uses, and at Camp Wikoff, near Montauk Point, Long Island, personally helped in the care of sick and convalescent soldiers, besides donating \$50,000 for supplies. Other notable gifts include the



## VARIOUS GOURDS

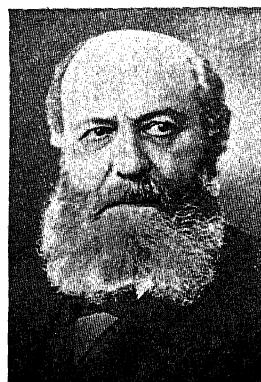
(a) Dishcloth gourd; (b) pumpkin; (c) watermelon; (d) Hubbard squash; (e) mammoth white bush squash; (f) muskmelon; (g) crookneck squash; (h) cucumber; (i) snake gourds.

library building of New York University, a \$10,000 donation to Rutgers College, and one of equal value to the school of engineering of New York University, and a generous contribution to the Hall of Fame (which see). She was also deeply interested in charity work among the children of the poor. In 1913 Miss Gould married Finley J. Shepard, a prominent railway official. She became a member of the board of the Russell Sage Foundation and of the Women's International War Relief Association, and received honorary degrees from New York University and the American College for Girls in Turkey.

**GOONOD**, *goō no'*, CHARLES FRANÇOIS (1818-1893), a French musician, whose fame as a composer rests chiefly upon his popular opera *Faust*. Critics, however, value his *Romeo and Juliet* more highly. Gounod was born in Paris, studied at the Conservatoire and later in Rome, where his musical instincts seem to have been mainly ecclesiastical. In fact, for two years he studied theology with the idea of entering holy orders, but what subsequently was the Church's loss became the gain of the musical world.

His *Saint Cecilia's Mass* and the two oratorios, *The Redemption* and *Mors et Vita* (Death and Life), are his most successful efforts in the domain of "religious" music.

At the outbreak of the Franco-German War in 1870, Gounod took refuge in England, where he remained and made his home for many



GOONOD

years. In 1871 he composed his "Biblical elegy," or cantata, *Gallia*. Of his numerous songs, the best known are *Maid of Athens* and *There is a Green Hill Far Away*. See OPERA (Some of the Famous Operas).

## GOUR. See GAUR.

**GOURD**, *gohrd*, or *goord*, a popular name for a family of ornamental trailing or climbing vines, bearing hard-shelled fruits of various shapes. In its wider sense, the term also includes squashes and pumpkins, which really belong to the same family, as also do melons and cucumbers. These last differ from the typical gourds in that they are in part edible.

When a large amount of vine is desired quickly, to cover arbors, waste places, or walls, gourds are very desirable. If the seed is planted in light, rich soil in a sunny location, when danger of frost is over, they are easily cultivated and require about the same care as squashes. These vines produce large, alternate leaves with pointed lobes, and blossoms which are yellow in most species and often striking and handsome. The fruits of various species appear in many shapes and markings, and may be put to a number of uses.

**Kinds and Uses.** The *dishcloth*, or *towel*, *gourd* is a species which has become prominent in America. The interior of the dried fruit is fibrous, and, when properly prepared, makes a dishcloth or bath sponge which is always sweet and clean. Very young fruits of this variety are edible.

The *bottle gourd*, also called *sugar trough*, produces bottle-shaped fruits which, when dried and emptied of seeds, are excellent water carriers, for the liquid remains cool in such a vessel. Pilgrims in the Orient used bottle gourds. They might be called the original thermos bottles.

Another species, the *nest-egg gourd*, produces small, egg-shaped fruits which may very well be used as nest-eggs, as the name implies.

Other species are the *dipper*, *pipe gourd*, or *calabash* (see CALABASH), *apple-shaped*, *orange*, *pear-shaped*, *powder horn*, and *Hercules club*. All can be used as dippers, and they are ornamental and excellent as toys for children. A gourd in which the interior has dried and the seeds have loosened makes a natural rattle for a baby. The growing of gourds by children is one way of encouraging interest in plants.

B.M.D.

**Classification.** The scientific name of the gourd family is *Cucurbitaceae*.

**GOURDE**, a standard coin of Haiti. See MONEY (Foreign Monetary Standards).

**GOUT**, *gout*, a disease characterized by paroxysms of severe pain and swelling in the joints, notably those of the fingers and great toe. Gout is caused by dietetic disturbances, especially faulty oxidation of protein foods (see METABOLISM). It is marked by an excess of uric acid in the blood; the salts of this acid are deposited in the body of the joint, causing swelling, redness, and extreme soreness, the characteristic symptoms of "gouty pains." If the condition is not cured, affected joints may become permanently stiff and deformed.

A tendency to gout may be inherited, but it especially attacks those addicted to idleness and intemperance. Eating rich, highly seasoned foods, drinking excessively of sweet wines and malt liquors, and refraining from exercise mark the path to gout. Control of this ailment depends on strict regulation of the diet and of living habits. In case of an acute attack—accompanied by agonizing pain, fever, thirst, and lack of free kidney action—keep the affected joint raised and warm, apply hot applications or capsicum vaseline, and give the patient plenty of hot lemonade.

W.A.E.

**GOVERNMENT**, the political machinery by which a community or state exercises control over its public affairs; the term also popularly embraces the body of men through whom this control is exercised. Official oversight of all the public affairs of men and also of many of their more private undertakings has been necessary since people first came into contact with each other. Every man has a right to a certain degree of personal liberty. He is not to be denied this right, so long as in its exercise he does not encroach upon the rights of others. One man cannot take from another any privileges he may justly claim for himself. If among inalienable rights are those of "life, liberty, and the pursuit of happiness," then all men must consent to such control as will preserve the balance between right and wrong in human affairs.

The general purpose of all government is "to establish justice, insure domestic tranquillity, provide for the common defense, promote the general welfare, and secure the blessing of liberty . . . ." To attain these ends, a government defends the people against foreign aggression; supports courts of justice; regulates property rights of individuals; and determines the political rights and duties of citizens or subjects and the privileges of aliens.

A government assumes control of various matters directly relating to the welfare of its people which might conceivably be trusted to private enterprise. It coins money; regulates trade and commerce; maintains roads, highways, and postal systems; provides sanitary regulations; enforces public education; and cares for the sick and the poor. As to the extent to which a government should control at least a few of the functions above noted, statesmen are unable to agree. Some contend that all matters should be left to individuals to the limit of their ability to manage affairs, while others, on the contrary, would have the field of governmental action greatly extended. The extreme of this latter view is represented by the theories of socialism; the socialists would have the government not merely regulate all great public business enterprises but actually own and operate most of them, such as railroads, telegraphs, express companies, and the like. The argument directly opposed to state ownership and control and representing the extreme of individual liberty is offered by nihilism and in the theories of the anarchists; both of the latter would use force to abolish all centralized authority and to substitute absolute individual freedom.

Some kind of government has existed among peoples from the earliest times, but while scientific development has been steady, there is not yet a normal or absolute type which may be pointed to as a fairly perfect model. Governments have grown, developed, and changed with the advancing times; all countries are more carefully administered to-day than formerly; but no two nations employ exactly the same means to put into effect their policies. With respect to their nature, governments may be classified broadly as *autocratic* and *constitutional*, or *popular*. In the former, power is exercised without restraint by an individual or by a few selected members of the state; in the latter, comprising republics and limited monarchies, power is vested in the entire body of persons who compose the state, and these delegate immediate authority to their agents. Only constitutional governments "derive their just powers from the consent of the governed." Of autocratic governments to-day, there are no striking examples; Russia and Turkey have disposed of czar and sultan; before the World War, they were conspicuous

autocracies. Of popular governments, the early democracy of Greece is usually cited as the most striking ancient example; numerous attempts at republican institutions have been made in various countries of every era since the Greek, and to-day, the United States, Switzerland, France, Germany, Czechoslovakia, Poland, Brazil, Chile, and the Argentine Republic are conspicuous examples of important countries in which republican government, with no monarchical tendencies, appears to be successful and permanent.

The mere form and name of a government are not sufficient to place it in one or the other of the foregoing classes. A republican form existed in Rome long after the assumption of power by the emperors, while, on the other hand, many of the Latin-American republics of the present day are scarcely more than systems of autocratic control in disguise. It may be noted also that the present régime under the king of England, known as a monarchy, is in reality controlled and managed by the people, and is therefore republican in fact. In nearly every monarchy, the royal power has been largely transferred to the people by means of legislative bodies, the members of which are elected directly by the people. In Italy, on the other hand, the tendency since the World War has been in the direction of autocracy, though the autocratic power, in this case, is not in the hands of the reigning monarch. See **ITALY** (*History*).

**Related Subjects.** See **ARISTOCRACY**; **MONARCHY**; **PUBLIC**; also, in alphabetical order, concrete descriptions of the government of each country, state, and province. At the end of the article **CIVIL GOVERNMENT**, numerous topics of interest in this connection are indexed.

**GOVERNMENT OF INDIA ACT.** See **INDIA** (*Government*).

**GOVERNMENT OWNERSHIP.** See **RAILROAD** (*Government Ownership and Operation*).

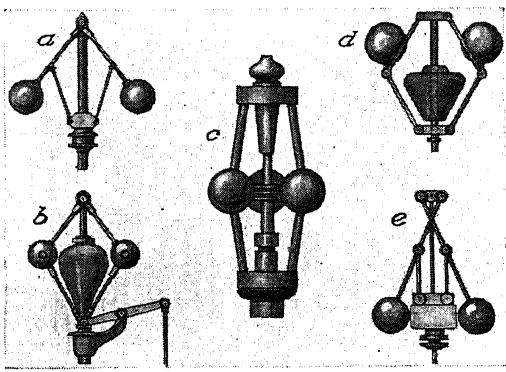
**GOVERNMENT SCHOOLS.** See **SCHOOL** (*Special Schools*).

**GOVERNOR**, a mechanical device for controlling the speed of steam engines and motors. The usual form consists of an upright shaft kept revolving by power supplied from the engine, and supporting a pair of metal balls. If the speed of revolution becomes too great, the two balls are compelled by centrifugal force to fly farther apart. By this action, a valve connected with the cylinder is opened and steam is allowed to escape until the normal speed is again reached. Should the speed be too slow, the balls fall closer together and automatically open a valve which admits more steam to the cylinder. Governors differ in design, but the object of all is the same.

**GOVERNOR**, the chief executive of a state of the American Union, elected by the people for a term varying from one to four years. His paramount duty is to enforce the laws of

his commonwealth; another obligation compels him to report to the legislature the general condition of the state, and to recommend needed legislation; he also has power to convene the legislature in special session. Before a bill becomes a law, after passage by the legislature, it must receive his signature; if he vetoes a bill (see **VETO**), it is returned to the legislature for reconsideration. The power of pardoning criminals is generally vested in him, although a number of states have created pardoning boards which share this power with the governor. He appoints minor state officers, and in some states the members of commissions and boards, but confirmation is usually required by the senate in these cases. He is commander in chief of the state militia. Salaries of governors range from \$3,000 to \$18,000 per year; Pennsylvania pays the latter sum.

**GOVERNOR-GENERAL**, the personal representative of the English sovereign in Canada, and under the king the executive head of the Dominion government. In all executive functions relating to the internal interests of the provinces, he acts with the Privy Council, composed of Canadian statesmen, and is bound by the advice of its members, but he has the power of reserving for the consideration of the Imperial government any proposed legislation which in his opinion endangers interests of the British Empire. The Governor-General's position is therefore dual; he knows no superior other than his sovereign when royal rights are threatened, but is a servant of the Dominion in purely local affairs. His attitude toward Canadian political factions is that of strict neutrality. He is appointed by the Eng-



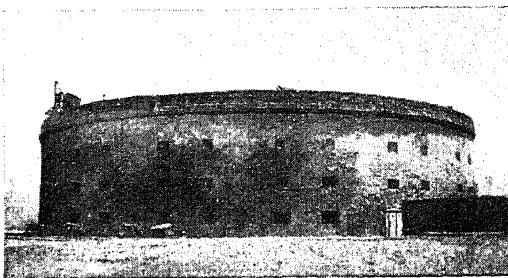
GOVERNORS

(a) The simplest form, called Watt's governor; (b) Porter's; (c) Pickering's; (d) Pröll's; (e) spring governor.

lish ruler, usually for a term of five years; his salary is \$50,000 per annum. See **CANADA** (*Government*); **PRIVY COUNCIL**.

**GOVERNOR'S ISLAND**, a small island in the Bay of New York, near the lower end of

Manhattan Island, at the entrance to East River. Originally, it comprised sixty-five acres, but this area has been almost doubled by the addition of filled-in land. It is used entirely



ON GOVERNOR'S ISLAND

Castle William, built in 1812. It is no longer of value as a fortification, but for many years has been utilized as a military prison.

by the United States government for military purposes, and has forts, now obsolete, originally designed for protection of the great metropolis.

**GOWK.** See ALL-FOOLS' DAY.

**GOYA, FRANCISCO** (1746-1828), whose name in full was FRANCISCO GOYA Y LUCIENTES, was the leading painter of Spain during the eighteenth century. His parents were lowly peasants, but they were able to place their son in an academy, where the genius he possessed began to assert itself. Later, he studied in schools in Naples. He was also an etcher and a designer of tapestries. Two of his paintings, a portrait of Don Sebastian Martinez and his "Jewess of Tangier," are in the Metropolitan Museum of Art, New York City.

**GOYT RIVER.** See MERSEY RIVER.

**GRACCHUS, grak' us,** the name of a distinguished Roman family, of which the following were prominent members:

**Tiberius Sempronius Gracchus**, a Roman magistrate (born about 210 B.C.), who also served as a general in Spain and Sardinia. He married Cornelia, daughter of Scipio Africanus the Elder, and was the father of the two best-known Gracchi, to whom their mother referred as her jewels.

**Tiberius Sempronius Gracchus** (160-133 B.C.), a Roman politician, who, under his brother-in-law, the younger Scipio Africanus, served at the siege of Carthage and was the first man to mount the walls. He was appointed quaestor in 137 B.C. in Spain, and remained there during the Numantine war. In 133 B.C. he was elected tribune of the people and sought to introduce land reforms to improve the condition of the poorer classes. At the end of his term he tried, contrary to the laws, to secure reelection, and was killed in resulting disturbances.

**Caius Sempronius Gracchus** (158-121 B.C.) was a quaestor in Sardinia in 126 B.C., and was afterward elected tribune of the people. He renewed the laws of his brother, and tried to substitute a democracy for the existing aristocratic form of government. He was reelected to the tribuneship in 122 B.C., but became

unpopular and failed to win the office a third time. Riots ensued, and at his own request, Caius was killed by his slave. See TRIBUNE; QUAESTOR.

**GRACE**, a title of courtesy used in connection with dukes, duchesses, and archbishops, who are addressed as "Your Grace."

**GRACE**, a prayer, or blessing of food, at a meal. It is sometimes said before and sometimes after a meal, and again, on both occasions. The word in this connection once was used in the plural form, *to give graces*, meaning to render thanks. Among the Christians it probably has been derived from the example of Jesus, who gave thanks before distributing the loaves and fishes, and before and after the Lord's Supper. It is, however, both a Jewish and a Christian custom.

**GRACE, DAYS OF**, three days formerly allowed in which to make payment of a note or draft after the day on which it became due. The Uniform Negotiable Instruments Law, which has been adopted in practically all the states, provides as follows: "Instruments falling due (or becoming payable) on Saturday are to be presented for payment on the next succeeding business day, except that instruments payable on demand may, at the option of the holder, be presented for payment before twelve o'clock noon on Saturday when that entire day is not a holiday." A few states still retain days of grace on sight drafts, and a very few states have other stipulations governing under certain conditions. In general, however, it is fair to say that days of grace are no longer allowed in the great majority of states. See NOTE.

F.H.E.

**GRACES, THE THREE**, in Greek mythology, the daughters of Zeus and Eurynome. They were three goddesses who presided over the dance, the banquet, and all kindred pleasures and polite accomplishments. The Graces belonged to the retinue of Venus, and were her usual companions. According to another version of their origin, they were the daughters of Bacchus and Venus.

The English poet Spenser describes them in these words:

These three on men all gracious gifts bestow  
Which deck the body or adorn the mind,  
To make them lovely or well-favored show;  
As comely carriage, entertainment kind,  
Sweet semblance, friendly offices that bind,  
And all the complements of courtesy;  
They teach us how to each degree and kind  
We should ourselves demean, to low, to high,  
To friends, to foes; which skill men call civility.

**In Literature and Art.** In the writings of the Greek poet Hesiod, they are given the names of Aglaia (Brightness), Euphrosyne (Joy), and Thalia (Bloom). Homer represents them in the *Odyssey* as the attendants of Aphrodite (Venus). In art they are grouped together, usually embracing each other or clasping hands. There is a well-known painting of the Three

Graces in the Louvre, Paris, the work of a French artist, Jean Baptiste Regnault.

**GRACKLE, OR GRAKLE,** *grak'le*, in America, the name applied to various kinds of blackbirds, the best known of which is the *purple grackle*, or *crow blackbird*. In India and in Europe, the name is given to various birds of the starling family which show considerable intelligence; they readily learn to perform various amusing tricks, and can imitate the human voice. See CROW BLACKBIRD. D.L.

**GRADATION.** See GEOLOGY (Work of the Atmosphere).

**GRADY, HENRY WOODFIN** (1851-1889), an American orator and journalist, whose work as editor of the Atlanta *Constitution* from 1880 to his death was an important factor in uniting the South and the North after the War of Secession. He was born in Athens, Ga., and after graduation from the University of Georgia, began his work as a journalist in a series of letters on the resources of his native state. As correspondent of various publications, he attracted wide notice by his articles on building up the South, while "The New South" was his chief topic as an orator.

**GRAEAE.** See PERSEUS.

**GRAFTING.** If a bud or twig from one plant be inserted in a cut made in the surface of another, of the same or a related species, in such a way that there can be a circulation of sap between the parts, the two will unite and a new growth will result. This operation, known as *grafting*, or *graftage*, is a method of propagating plants which is employed in the culture of nearly every kind of fruit tree and of numerous flowers, ornamental trees, and shrubs. The portion upon which the detached shoot is inserted is called the *stock*; the transferred part is called the *cion* (or *scion*); and the new growth the *graft*. The practical value of this form of plant husbandry is unquestioned, but its full possibilities and its limitations can be learned only by direct study and experiment.

**Purposes of Grafting.** The fundamental object in grafting is to perpetuate a variety which does not reproduce by seeds, and which cannot be grown from cuttings with economy. The art of graftage, however, has several other distinct advantages. It is employed in many instances to increase the rate and ease of multiplying plants, for the new growths are borne

upon old roots or branches, and the time necessary for producing new roots is saved. Grafting also may bring about a desired change in the character or habit of cion or stock. Such a change may be the dwarfing of a certain variety, a device sometimes employed to increase the yields of a plant; for checking growth usually promotes fruitfulness.

Again, plants are sometimes adapted to unfavorable soils by means of graftage, as in the case of certain varieties of plums, which ordinarily flourish only in heavy soils. When grafted on the peach, such plums thrive in light soils, and peaches can in the same manner be made to grow in heavy soils. The fruit-grower also resorts to graftage to adapt his plants to unfavorable conditions of climate. The date of fruit-bearing is frequently advanced by inserting cions from young orchard trees into the stocks of old trees. This process is of special advantage to nurserymen who wish to test new orchard fruits. The propagation of hardy plants is accomplished by use of stocks that are resistant to certain insects and diseases.

**General Methods.** Though the methods of grafting are numerous and varied, there is one thing absolutely necessary for success, and that is to have the *cambium* layer of the cion coincide at some point with the corresponding layer of the stock. The *cambium* layer is the living tissue in plants, the part through which rises the sap that nourishes them. In the spring, when it is in a soft, mucilage-like condition, it readily heals and unites wounded surfaces. For this reason, spring is the most favorable time for grafting most plants. However, the locality, the kind of plant, the climate, and the object in view must all be taken into consideration, and no unvarying rule can be stated as to time or method of starting new growths. The wood for cions is taken when the plant is in a resting condition, preferably in the autumn, after the leaves have fallen, and before the time of heavy frosts. The cions are then placed in moist soil or sand, where they will be protected from freezing but not have sufficient warmth to cause the buds to swell. Sometimes, however, cuttings are taken in the spring, at or just before the time of graftage.

The three general kinds of graftage are *bud grafting*, *cion grafting*, and *inarching*. Each of these can be subdivided into several classes, but only the standard methods in common use are here discussed:

**Bud Grafting**, or *budding*, consists in applying a single bud to the *cambium* layer of the stock. It is a form of graftage that is employed in the culture of nearly all young fruit trees, and of roses and many ornamental trees. It is performed most successfully in dry, clear weather and when the bark peels easily. The transferred part, which includes a healthy bud



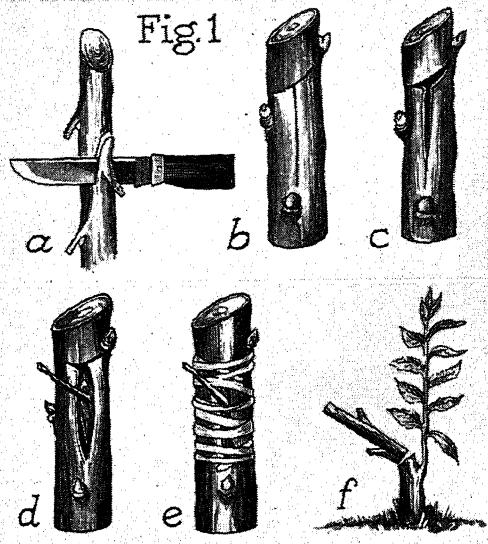
Photo: Brown Bros.

HENRY W. GRADY

from a twig of the current season's growth, a portion of bark, and a bit of wood beneath the bud, is secured by placing the thumb beneath

whether the wood is cut off or retained. Two incisions are made in the bark of the stock, one vertical and one crosswise; the latter is made across the top of the vertical cut, form-

Fig. 1

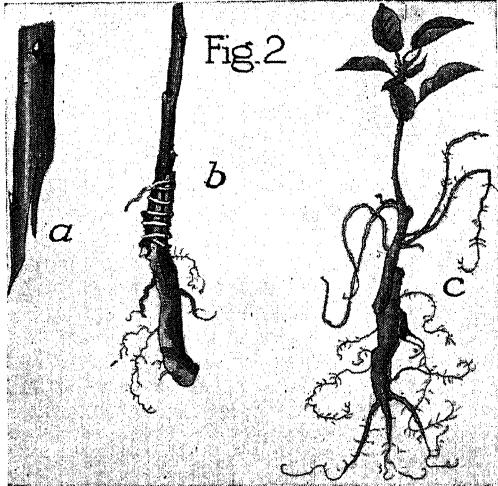


## BUD GRAFTING

- (a) Cutting the bud.
- (b and c) Preparing the stock.
- (d) Inserting the bud.
- (e) Tying.
- (f) Cutting off the top.

the bud and cutting a shield-shaped section out of the bark (see Fig. 1, a). The entire severed portion is technically known as the *bud*. A part of the stalk of each leaf is usually left on

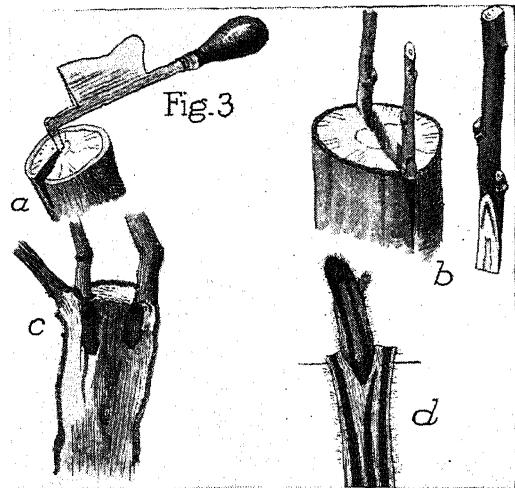
Fig. 2



## WHIP GRAFTING

- (a) Cion;
- (b) root graft;
- (c) growing root graft.

the bark, to serve as a handle in inserting the bud. Some nurserymen remove the attached wood, but buds appear to thrive equally well

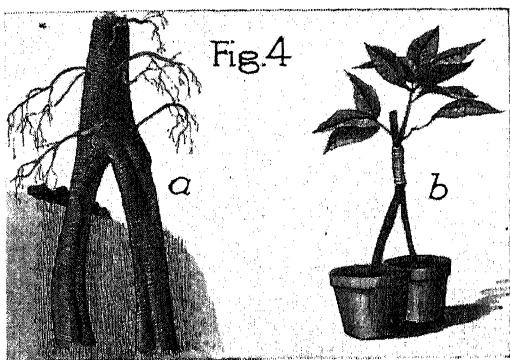


## CLEFT GRAFTING

- (a) Opening slit with grafting chisel;
- (b) cleft-graft cions inserted in stock;
- (c) vertical section of a cleft-graft a year after setting;
- (d) cleft-graft of cactus.

ing a T-shaped wound (Fig. 1, b, c). The workman then inserts the bud into the cleft, pushing it down part way with the fingers and completing the operation by striking the leaf-stalk handle with the back of his knife-blade. Usually the bark has to be loosened to permit the bud to enter the cleft. The further processes in bud grafting are detailed in the illustration.

Fig. 4



## GRAFTING BY APPROACH

- (a) Natural graft of forest trees;
- (b) inarching of potted plants.

**Cion Grafting**, or *grafting proper*, is the insertion of a detached twig, bearing one or more buds, upon the surface of the stock. It is done in a great variety of ways, to which many special names are given. In regard to the place where the grafting is done, there are

four general methods—*root*, *crown*, *stem*, and *top* grafting. Classification according to manner of operation gives rise to such terms as *cleft*, *whip*, *bark*, *saddle*, and *splice* grafting. Of these methods, the ones most generally used are whip grafting and cleft grafting.

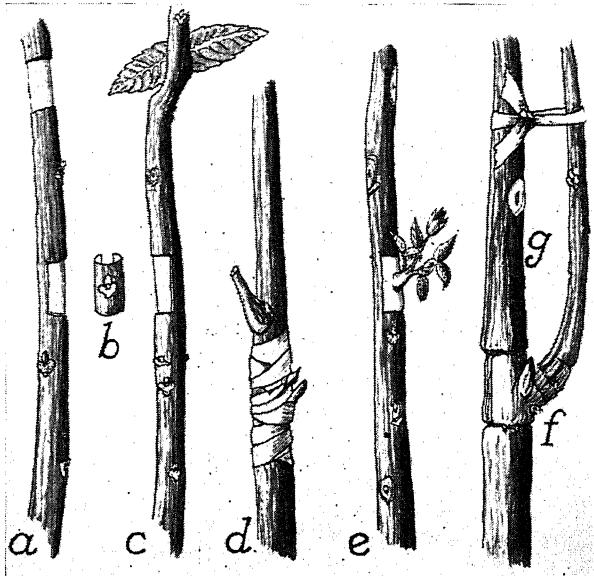
**Whip Grafting**, also known as *tongue grafting*, is the favorite method for grafting cions on roots. The stocks are dug up in the fall and stored until January or February, when the grafting is begun. Both the stock and the cion are cut smoothly and diagonally, the cut surface being from one to two inches across. A vertical cleft is then made in each surface, so the two parts will have notches and tongues that exactly fit into each other (Fig. 2, *a*). Cion and stock are then joined, the tongue of the cion being pushed into the cleft of the stock. The joint is then securely wrapped (Fig. 2, *b*). Waxed string, or bands made by spreading melted wax over thin muslin and cutting it into narrow strips when dry, are excellent for this purpose. The grafts are packed away in sand, moss, or sawdust in a cool place and left until spring, when they are planted. If the storage place is not above 40° in temperature, the two parts of the graft will be found firmly knitted together by planting time, and in good condition. Grafts stored in warm, close cellars are liable to rot.

The length of cion and stock varies, but in severe climates it has been found advisable to use a cion from eight inches to a foot long and to graft it on a short root. The graft is placed in the soil in such a way that only the topmost bud is left exposed, and as the plant grows, roots are sent out from the cion. The tree thus becomes "own rooted," and is thought to be hardier than one which obtains its nourishment only from the roots of a stock. Fig. 2, *c*, shows a cion which has sent out roots.

**Cleft Grafting** is especially adapted to trees too large for whip grafting, and is the method

almost universally employed for top grafting old trees. Cions for spring grafting are usually cut in a late fall or winter, and stored until spring. The stock, a branch from one to one and one-half inches in diameter, is cut off squarely, forming a section with a smooth, flat end surface. This end is then split, and into the cleft is inserted a cion with a wedge-shaped base (Fig. 3, *a*, *b*). Usually the cion has three buds, the lowest one being just above the wedge-shaped section, and its sides are cut smooth and even. It is necessary to have the outer edge of the wedge a little thicker than the inner one, in order that the stock may press upon it and hold it securely at the point where the union first takes place. The end of the stock, known as the *stub*, is usually large enough for the insertion of two cions, one upon each side of the split. Not only does the double grafting increase the chance of success, but it also has the advantage of hastening the healing of the wound, which is thoroughly covered with wax to exclude air and moisture. Fig. 3, *c*, shows a vertical section of a cleft graft a year after setting. Cleft grafting is also used on cactuses, and on peonies, dahlias, hollyhocks, and other thick-rooted plants. In the case of the cactus, the cion is held in place with a cactus spine or pin, and bound with cord, waxing being unnecessary (Fig. 3, *d*), as the plants are very hardy and survive extreme conditions.

**Other Methods.** *Bark grafting* is exceedingly useful in repairing large trees whose branches have been broken off. The cions are pushed down between the bark and the wood at places where the bark is loosened for that purpose. The cions, several of which may be inserted in one stub, must be cut very thin, so they will not injure the bark of the stock. They are held in place by a tight bandage, and wax is also applied, as in cleft grafting. This operation is known also as *crown grafting*. *Saddle graft-*



PECAN-CULTURE ANNULAR BUDDING

(*a*) Bud stick, from which the bud has been removed. (*b*) The bud, ready for insertion in the matrix of the stock. (*c*) The stock, ready to receive the bud. (*d*) The bud, after being placed in position and carefully wrapped. (*e*) Growth taking place, the wrapping having been removed. (*f*) Growth from the bud, supported by being tied to the stock (*g*) above the union. Note the scars above the union, where the buds were removed, in order to direct the flow of sap to the new bud.

3, *c*, shows a vertical section of a cleft graft a year after setting. Cleft grafting is also used on cactuses, and on peonies, dahlias, hollyhocks, and other thick-rooted plants. In the case of the cactus, the cion is held in place with a cactus spine or pin, and bound with cord, waxing being unnecessary (Fig. 3, *d*), as the plants are very hardy and survive extreme conditions.

*ing* is frequently employed in the propagation of shoots of small plants. The stock is given a wedge-shaped end, and the cion split and set upon this. The joint is then tied and waxed. *Splice grafting* is a useful method for working upon small shoots whose wood is too soft and tender for splitting. The two parts are simply cut across diagonally, laid together, and secured by means of string and wax.

*Inarching*, or *grafting by approach*, is a process that sometimes occurs in nature without the aid of man; the union of the two oak trees shown in Fig. 4, *a* is an example of a natural graft in the forest. Inarching is the process of grafting two plants or branches, both of which are attached to their own roots. It is used to remedy defects in trees, to propagate potted plants that do not unite easily by other methods, and has been of special value in scientific fruit development. To join the parts, it is necessary only to remove a portion of the bark on each plant, bring the wounded surfaces in contact, and then bind stock and cion closely together (Fig. 4, *b*).

The details of a typical process in fruit culture are about as follows: A seedling, which has been left growing long enough to bear about half a dozen leaves, is taken up with the ball of earth clinging to its roots, and transferred to a foster tree. A wound is made in the surface of each plant by scraping off the outer bark, the two are bound together, and the graft is left to itself to complete the process. In a few weeks, when the nursling has begun to feed upon the larger plant, the soil is removed from the roots of the cion, and the roots themselves are trimmed off. Later the top of the stock is also removed, and the nursling receives all of the nourishment from the vigorous roots. The resulting tree grows rapidly and bears fruit much sooner than would have been possible had it been left to Nature.

A grafting process to use with the pecan is detailed in the illustration on page 2887.

The United States Department of Agriculture at Washington has carried on a long series of experiments in inarching and other forms of grafting, and the results of these investigations, which are of great interest and value, may be secured on application.

C.F.C.

**GRAF ZEPPELIN.** See AIRCRAFT, subhead.

**GRAHAM**, ANDREW J., originator of a system of shorthand. See SHORTHAND WRITING.

**GRAHAM**, SYLVESTER, the man for whom graham flour was named. See FLOUR.

**GRAIL, THE HOLY.** See HOLY GRAIL.

**GRAIN ELEVATOR.** This term applies to a building equipped with machinery for loading, unloading, cleaning, and storing grain, and includes the machinery which elevates or lifts the grain from train or ship to the storage bins. Grain elevators, formerly made of wood, are now often of concrete construction, three or

more stories in height. The top floor of the building, called the *cupola*, contains the loading and unloading machinery and the shafts through which the grain is distributed. The second story contains the garners and storage bins, and on the ground floor are the weighing hoppers and cleaning machinery. Railway cars are unloaded by shoveling the wheat into a pit, from which it is drawn into the elevator by means of an endless belt with buckets attached at intervals, as detailed in the illustration on next page.

Elevators for unloading and loading ships are equipped with shafts, or "legs," on the dock side. The hatches of the vessel are removed, the legs are lowered into the hold, the machinery, operated by steam, gas, or electric power, is set in motion, and the grain is quickly drawn up into the bins. In large elevators, 12,000 bushels of grain per leg may be unloaded each hour. As several legs are at work at the same time, the speed of unloading is remarkable. One of the largest elevators in the world stands alongside the docks at Superior, Wis. It has sixteen legs and can load or unload the largest grain-carrying vessel in less than four hours. Loading is simply a reversal of the operations of unloading. Hollow legs communicating with the storage bins are lowered into the hold of the vessel, the bins are opened, and the grain pours into the vessel.

There are grain elevators in most English and European towns, but they are not as large nor do they handle such quantities of grain as annually pass through the elevators of Canada and the United States. The elevators of Port Arthur and Montreal, Canada, as yet the largest in the world, are noted for their speedy loading and unloading of vessels, and yearly handle great quantities of grain from Western Canada.

**GRAIN FUTURES ADMINISTRATION.** See AGRICULTURE, UNITED STATES DEPARTMENT OF.

**GRAINS**, the "breadstuffs" of the world, the seeds of several valuable plants of the grass family. Because Ceres, the Roman goddess of the harvest, presided especially over the growth of the grains, they are commonly known as cereals.

The true cereals belong to the grain family of plants; hence the terms *grains* and *cereals* are not synonymous. For instance, buckwheat, although a grain plant, is not a cereal. Since bread is more widely used by civilized man than any other food, the raising of grain constitutes one of the greatest industries in the world. There are six kinds of grain of chief importance; these are wheat, rice, corn, oats, barley, and rye; and as each has its own requirements and habits of growth, it grows best in certain climates and locations. But each grain, wherever it grows in great profusion, is likely to



# GRAINS





constitute the chief food of the mass of people. Time was, before the world was made comparatively small by railroads and steamship lines, when the people of a wheat-growing region had no rice, and the people of a rice-growing region scarcely knew what corn looked like; and while to-day such conditions have been done away with, the lines of demarcation are still in most cases rather clearly drawn.

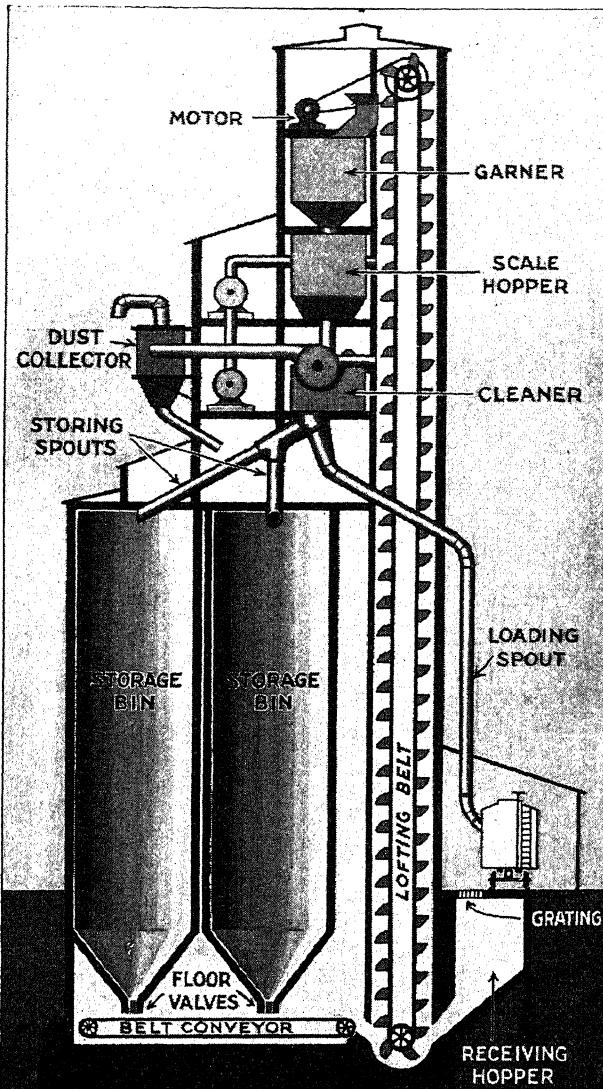
Thus in the United States and Canada, whose wheat-growing possibilities are not surpassed elsewhere in the world, wheat is the staple breadstuff; while in China, where wheat cannot be grown easily and cheaply, but where rice thrives in the watery fields, the people subsist almost entirely on rice. Asia might be called the "rice continent," just as America is the "corn and wheat continent," and since the rice regions are those which have been most thickly settled, statistics show that rice forms the chief food of more people than any other grain.

Wheat is generally conceded, however, to be the most satisfactory bread material, though some nationalities of Europe use barley or oats or rye, and in the southern parts of the United

States, Indian corn is a favorite breadstuff. The table on page 2890 shows the comparative food values of the various grains.

T.L.L.

**Related Subjects.** Under their proper titles in these volumes the various grains are fully treated, and many interesting points are there brought out—what each grain demands for successful growth, where each is most lavishly produced, and what is the relative value of each. See, also, BREAD.



HOW GRAIN IS HANDLED

Incoming grain is shoveled from the freight car through a grating into a receiving hopper. From this, it is caught up by buckets attached to a lofting belt and carried to the top of the elevator. There it is dumped into the garner, and it passes from there into the scale hopper, where it is weighed. It next enters the cleaner, and from there reaches the storage bins, by way of storing spouts.

Outgoing grain leaves the storage bins at the bottom, through floor valves, and is carried by a belt conveyor to the lofting belt. This, in turn, carries the grain up to the top of the elevator, through the garner, scale hopper, and cleaner, to the loading spout and out to the car.

Grain weevils do not breed in anything but thrashed grain, but the rice weevils lay eggs in standing grain and in the shocks. Whenever storage

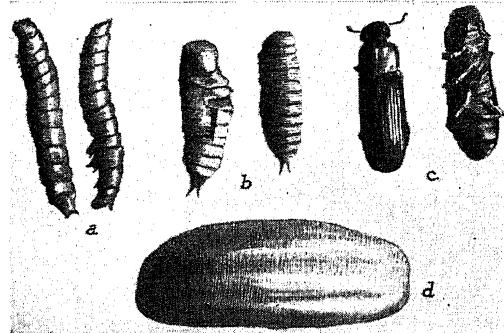
**GRAIN WEEVILS**, *we' v'lz*, various small, dark-colored beetles that infest grains stored in granaries, warehouses, and elevators. The species that infest granaries and the rice weevil are the best-known of these insect pests. The rice weevil feeds on other grains besides rice, but is especially destructive to the rice crops of the Southern United States. The weevils are about one-sixth of an inch in length, including a long snout that extends from the head. The granary weevil has no wings, but these organs are well developed in the rice weevil. The female beetle punctures the grain with her snout and lays an egg in the hole. The egg hatches into a tiny white, footless grub, which eats into the grain. Within about forty-one days, an egg produces a full-grown beetle, so eggs laid in grain still in the field would produce beetles in the granary or mill. They, in turn, multiply rapidly, especially in dark places.

The granary weevils

## CHEMICAL COMPOSITION OF GRAINS

| GRAIN           | WATER            | PROTEIN         | FAT             | TOTAL CARBOHYDRATES | ASH             | FUEL VALUE PER POUND |
|-----------------|------------------|-----------------|-----------------|---------------------|-----------------|----------------------|
| Barley.....     | Per cent<br>11.5 | Per cent<br>8.5 | Per cent<br>1.1 | Per cent<br>77.8    | Per cent<br>1.1 | Calories<br>1,650    |
| Corn (dry)..... | 10.8             | 10.0            | 4.3             | 73.4                | 1.5             | 1,685                |
| Oatmeal.....    | 7.3              | 16.1            | 7.2             | 67.5                | 1.9             | 1,860                |
| Rice.....       | 12.3             | 8.0             | 0.3             | 79.0                | 0.4             | 1,591                |
| Rye.....        | 10.5             | 12.2            | 1.5             | 73.9                | 1.9             | 1,620                |
| Wheat.....      | 10.6             | 12.2            | 1.7             | 73.7                | 1.8             | 1,625                |

places have become infested, they should be thoroughly cleaned out before new harvests are stored. Infested grain should be fumigated



THE GRAIN WEEVIL

(a) Larvae; (b) pupae; (c) winged insect. Figure d represents a grain of rice, by which figures a, b, c may be compared. All the figures are much enlarged.

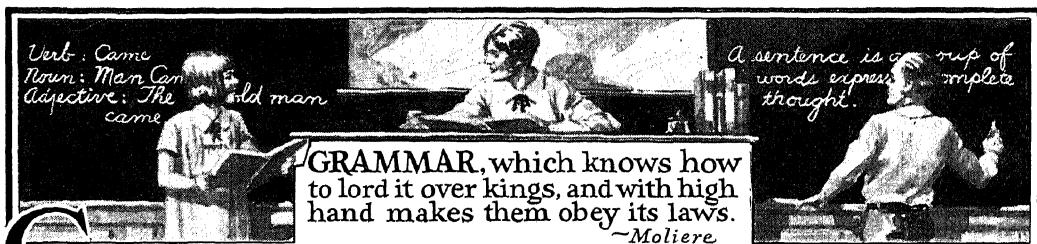
with carbon bisulphide. These weevils are sometimes found in packages of cereals. W.J.S.

**Classification.** The grain weevils belong to the family *Calandridae*. The rice weevil is *Calandra oryzae*; the granary weevil is *C. granaria*.

**GRAM**, in the metric system of weights and measures, is a measure of weight which is equal in mass to one-thousandth part of a kilogram. A gram is equal to 15.432+ grains, Troy weight, and its weight is the same as that of a cubic centimeter of distilled water at its greatest density, or when it is at the temperature of 39.2° F. The gram is used in weighing light articles and in compounding medicines. See METRIC SYSTEM, for comparative tables of all weights.

**GRAM, OR CHICK-PEA**, a leguminous plant whose fruit is a two-seeded pod. The seeds are eaten raw or boiled.

**GRAMINEAE**, the name of the grass family of plants. For list, see GRASSES.



**G**RAMMAR. Every language, in the course of its history, has had many different grammars. The grammar of a language is not a body of dead, dry-as-dust rules; it is the living system of its everyday usages, the customs established by those who are speaking the language. Therefore, since usage is not fixed but is perpetually changing, grammar necessarily changes with it. Shakespeare was not ungrammatical in writing, "This was the most unkindest cut of all," because in his day the double superlative was still used by the best writers and speakers; but modern grammar brands such expressions as incorrect, reasoning that if the ending *est* conveys the superlative idea, the superlative adverb *most* is not needed. The simplifying spirit of the

English tongue has constantly been discarding the superfluous.

English grammar may therefore be defined as the science which teaches the principles of correct English in speaking and writing, according to the standard of the educated people of the time. This covers not only the classes, forms, and uses of individual words, but the relations in which they stand to one another when joined in sentences to express thought. The word *grammar* comes from the Greek *gramma*, meaning *letter* or *writing*.

**Why We Study Grammar.** The chief reason for studying grammar is, therefore, to secure a mastery of "this universal English" of ours, the language spoken by over one hundred fifty million people. In the lower grades, in-

struction in English takes the form of "language lessons," which merely emphasize what is correct and correct what is wrong, without teaching a system of rules; for grammar is a science, and the minds of little children are as yet too undeveloped to grasp scientific principles. It is not until the seventh grade is reached that the best schools now think it profitable to introduce the study of technical grammar into the course of study.

Up to this time, the pupil has been taught to use certain expressions and avoid others, with little or no emphasis upon the reason for the distinctions. When he comes to the study of formal grammar, he learns the logical reasons for these things. As Dryden says:

Who climbs the grammar-tree distinctly knows  
Where noun, and verb, and participle grows.

New light is thrown on the work in language, and this developing insight stimulates fresh interest.

The pupil's efforts to express himself are growing more complex. He needs a basis of logical rules which will help him to look ahead in constructing a sentence and to choose phrases best suited to his thought. The fact that this process is usually unconscious does not obviate the necessity of choosing. The grammar study makes it possible for the pupil to criticize what he says, what he hears, and what he reads, in the light of the rules of grammar and good usage that he knows. He begins to realize that good speech will stamp him as a person of education and culture, and that, lacking it, he will be at a disadvantage, no matter how great his mental brilliance. Knowing and using good English, he has the confidence which comes from a knowledge that he can use the language as it is written and spoken by educated men and women.

The illustrations in the pupil's grammar text—quotations from the masters of modern English—furnish him with the best possible models of sentence structure, raise his standards, and arouse his interest in good literature. Incidentally, they give him a certain acquaintance with these writers which makes them seem like old friends when he comes to read their works.

Whether or not one believes that the study of grammar provides valuable mental training and strengthens the reasoning powers, a belief that is largely discredited by modern students of scientific education, there are other valuable aspects of the study of grammar which justify it. Some of them have been mentioned above. Another important value is the logical basis which English grammar provides for the study of other tongues, particularly German and the Romance languages, which are similar in grammatical structure.

**Divisions of the Subject.** The majority of modern grammarians recognize only two main

divisions of the science—*etymology*, which has been called the "grammar of words," and *syntax*, called the "grammar of sentences." The older textbooks included three others—*orthography*, or spelling; *phonetics*, or pronunciation; *prosody*, or versification—but these are now usually studied as independent branches, not properly belonging to grammar.

In the wider use of the word, grammar is *didactic*, *historical*, or *comparative*, according to its treatment. The grammar of our schoolbooks is termed didactic because it lays down the rules which govern current usage. Historical grammar concerns itself with one language, but not with one age, for it deals with all the recorded grammars of the language. Comparative grammar finds resemblances and differences among the various languages belonging to the same general family. Historical and comparative grammar are young sciences which came into being in the nineteenth century with the interest in Sanskrit, the ancient parent from which modern languages have sprung. The present article, of course, covers only the didactic grammar of the English language of to-day.

**Parts of Speech.** The "grammar of words," or *etymology*, is learned through the mastery of the eight groups into which all words have been divided. The word *etymology* in this sense means not only the history of words, but the study of words and their inflections, including their historical development. These classes are called the *parts of speech*, and comprise noun, pronoun, adjective (including the articles), adverb, verb, preposition, conjunction, and interjection. In these volumes, each is treated individually and should be looked for under its proper head.

In studying the parts of speech and learning the inflections and uses of each, the student finds it is not a case of "once a verb, always a verb," but that words are one part of speech or another solely according to the part they play in the sentence. The same word may serve in a number of capacities—verbs as nouns; nouns as verbs and adjectives; pronouns as nouns, adjectives, and even verbs. Thus, in Whittier's line, "The good is always beautiful, the beautiful is good," both *good* and *beautiful* are used once as noun and once as adjective.

**Sentence-Building.** *Syntax*, or the "grammar of sentences," has two divisions—*analysis*, which means taking a sentence apart into the elements of which it is composed, and *synthesis*, which means putting together words, phrases, and clauses to form a sentence. The sentence is the foundation or unit of all speech, and in English the vital factor in sentence-making is the position or order of the words.

In Latin, position is of slight grammatical importance; words may be shifted about so

## Outline on Grammar

### I. Definition

- (1) Deals with classes, forms, uses, and relations of words
- (2) Science of current usages
- (3) Derivation of word

### II. Purposes

- (1) To teach principles of correct speech
- (2) To develop keen observation and criticism of language
- (3) To cultivate desire for correct speech
- (4) To lay foundation for study of composition and literature
- (5) To furnish basis of grammar for study of related languages

### III. Classification

- (1) Ordinary use of term
  - (a) Etymology, the "grammar of words"
  - (b) Syntax, the "grammar of sentences"
- (2) Broader interpretation
  - (a) Didactic
  - (b) Historical
  - (c) Comparative

### IV. Etymology

- (1) Parts of speech and their inflections
  - (a) Noun
  - (b) Verb
  - (c) Pronoun
  - (d) Adjective
  - (e) Adverb
  - (f) Conjunction
  - (g) Preposition
  - (h) Interjection
- (2) Parts of speech a matter of function

### V. Syntax

- (1) Analysis
- (2) Synthesis
  - (a) Relation to composition
- (3) Order of elements of sentence
  - (a) Importance in English because of lack of inflections
- (4) Kinds of sentences
  - (a) Declarative
  - (b) Interrogative
  - (c) Imperative
  - (d) Complex and compound

### VI. Modern Tendencies

- (1) The trend toward simplicity
- (2) Dropping gender distinctions
- (3) Less frequent use of subjunctives
- (4) Short sentences in favor

as to make harmonious combinations, because it is their inflections that show in what relations the words stand to one another. In the English sentence, on the other hand, although there is a certain amount of freedom in arrangement, a change from the established

order usually changes the meaning. For instance, if we transpose subject and object in the sentence, "Wellington defeated Napoleon," making it read "Napoleon defeated Wellington" or "Wellington Napoleon defeated," we either change the meaning entirely or leave it a matter of doubt. The study of syntax is therefore essential to teach the relations of words and their proper order for the clear expression of thought.

Beginning with a model of a single declarative sentence, the student of grammar learns to separate it, first, into its essential subject and essential predicate, and then to analyze in further detail, indicating the object or the complement of the verb, and the various modifiers of subject and predicate. Following the same grammatical principles on which such a sentence was constructed, the student then builds sentences of his own. The next step is the mastery of simple interrogative and imperative sentences—learning the special arrangement and forms that are used to ask questions or give commands. From this point he proceeds to a study of the order which is to be observed in complex and compound sentences, declarative, interrogative, and imperative.

**Modern Tendencies.** The grammar of our language is always tending in the direction of greater simplicity—fewer distinctions and more liberal application of grammatical rules in everyday speech, so as to give greater freedom to colloquial language. "A grammarless tongue," English is often called, and so it seems when compared with German, Latin, and the various Romance languages founded upon Latin; for these are all less advanced than English and consequently far more complicated in their grammar.

As explained in the article on gender, distinctive forms for the feminine gender are being employed less and less. The subjunctive mode has almost disappeared from use, except in a few common constructions. The long, involved sentences which characterized the older writers have gone out of style, giving way to a large extent to short, crisp sentences, easy to construct and easy to comprehend. It is small wonder, then, in view of its marvelous flexibility and the unequaled simplicity of its grammar, that English is to-day more widely spoken than any other language of a civilized race.

**Related Subjects.** The article above aims to give merely a general treatment of the subject, but the following articles in these volumes give specific information on all the more important phases of grammar:

|            |             |
|------------|-------------|
| Adjective  | Conjugation |
| Adverb     | Conjunction |
| Article    | Declension  |
| Case       | Etymology   |
| Climax     | Gender      |
| Comparison | Infinitive  |

|                 |                 |
|-----------------|-----------------|
| Inflection      | Preposition     |
| Interjection    | Pronoun         |
| Mode            | Punctuation     |
| Noun            | Quotation Marks |
| Parsing         | Sentence        |
| Participle      | Syntax          |
| Parts of Speech | Tense           |
| Person          | Verb            |

**GRAMOPHONE**, *gram' o fone*. See PHONOGRAPH.

**GRAMPIAN HILLS**, a mountain mass in Scotland, extending across the country in a series of spurs from southwest to northeast, south of the Caledonian Canal. They form a natural barrier between the Scottish Lowlands and the Highlands [see SCOTLAND (The Land)]. The highest peaks are Ben Nevis, the loftiest in the British Isles, 4,406 feet; Ben Macdhui, 4,296 feet; Ben Lomond, Cairngorm, and Cairntoul. The hills are crossed by three railways and contain many passes affording views of some of the most romantic scenery in Scotland. In parts of the mountains are large forests, where game is carefully preserved for the sport of deerstalking. The mountains are largely of granite formation, and great quantities of the stone are quarried for building purposes.

The name *Grampians* is derived from a misreading of *Mons Graupius*, Agricola's designation for the mountain where he defeated the Caledonians in A.D. 84.

**GRAMPUS**, a name popularly applied to various sea mammals between a porpoise and a whale in size, but correctly applied to a genus of large dolphins. These animals are found in northern waters and in the Mediterranean Sea, and are not common. A typical grampus has a fishlike body and a rounded head lacking the beaklike snout of the dolphins proper. The color is grayish above, white below. The common grampus, also called *calfish*, or *Risso's dolphin*, may reach a length of twenty feet or more. All of the sea mammals mentioned above belong to the order known as *Cetacea*; *DOLPHIN*. L.H.

[The word *grampus* is also loosely applied to the killer whale, about twenty-one feet long, and of tremendous speed and strength. It preys largely on porpoises and seals. One grampus of the killer whale variety will spread wholesale death in a seal rookery. This dreaded fish passes through the Arctic Ocean, under the ice, if need be, from one great ocean to the other. It is always traveling, and always killing. In 1929, for the first time in a long period, it was observed in large numbers in the inside waters of British Columbia.]

**Scientific Name.** The grampus genus belongs to the family *Delphinidae*. The common grampus is *Grampus griseus*.

**GRANADA**, *grah nah' dah*, formerly a Moorish kingdom in Spain, but now divided into the three modern provinces of Granada, Almeria, and Malaga. The area of the province of Gra-

nada alone is 4,928 square miles, which makes it smaller than Connecticut. It is traversed by the Sierra Nevada Mountains, and has fertile plains which are mainly watered by



LOCATION MAP

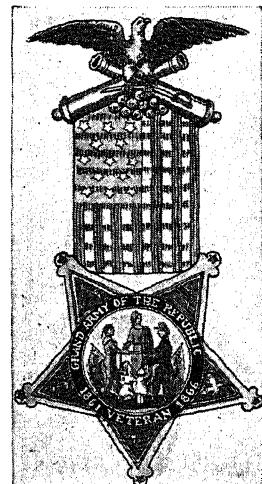
The black space in small corner map shows the portion of the entire country that is occupied by Granada.

the River Jenil, a tributary of the Guadalquivir. Its principal agricultural products are wine and oil; fruit is also abundant. Its mineral resources are lead, zinc, silver, iron, and coal. A railroad connects Almeria with Malaga and Madrid. The region was conquered by the Saracens in 811. In 1238 the Moorish kingdom of Granada was established, but the long Spanish war of Ferdinand and Isabella brought it to an end in 1492 with the capture of Granada. Population, estimated, 590,000. For a description of the city of Granada, see SPAIN (Principal Cities).

**GRAND ALLIANCE.** See COALITION.

**GRAND ARMY OF THE REPUBLIC**, a patriotic American society whose membership, composed of Northern veteran soldiers, is gradually decreasing as the War of Secession recedes into history. It was organized at Decatur, Ill., on April 6, 1866, a year after the close of the war. The purpose of its founders was to strengthen the ties that bound into fellowship the soldiers and sailors who fought to preserve the Union. They sought also to perpetuate the memory of those who sacrificed their lives for the cause, and to aid those who had been left in need by the death of their protectors.

Any soldier or sailor of the United States army, navy, or marine corps, who served between April 12, 1861, and April 9, 1865, and was honorably discharged, and members of state



BADGE OF THE G. A. R.

regiments who were subject to orders of United States officers, were admitted as members of the society, which grew in numbers until 1890, when the maximum membership of 409,489 was reached. In that year 5,476 veterans died, and the steadily increasing death rate has rapidly reduced the membership. Many local posts have voluntarily disbanded, through decrease in numerical strength.

The Grand Army is divided into local posts and departments representing the states, and annual meetings, known as encampments, are held. On official occasions, members wear a dark-blue uniform and a slouch hat. Though the Grand Army is in no sense a political organization, it has had a noticeable influence on pension legislation. The society has been active in charitable work and in founding soldiers' homes, and it is partly responsible for the custom of observing Memorial Day (which see). The Woman's Relief Corps (which see) is an auxiliary of the Grand Army.

**GRAND BAHAMA.** See BAHAMA ISLANDS.

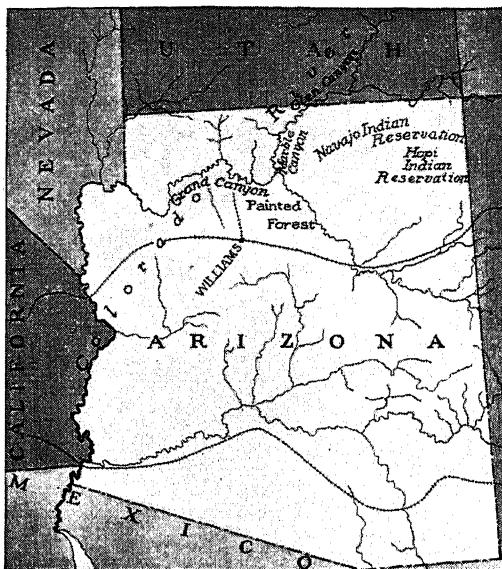
**GRAND BANKS**, one of the two chief sources of the wealth of Newfoundland, the other being timber. The Grand Banks are submerged areas of sand, gravel, and fragments of rock, stretching 200 miles along the coast of the island, and extending southeast into the Atlantic Ocean for a distance of 500 miles. Their waters range in depth from fifty to 1,000 feet. Thousands of sea birds, circling above them, indicate to the fisherman the location of the shallow waters teeming with fish; codfish, especially, are caught in enormous quantities (see Cod). Canadian and American fishermen, in craft especially equipped for fishing in these waters, brave the storms, floating icebergs, and dense fogs of the Banks. The heavy fogs are due to the meeting of the Labrador currents and the Gulf Stream. See FISH (Deep-Sea Fisheries); Cod.

**GRAND BASSAM**, *bas sahm'*, a city of the Ivory Coast (which see).

**GRAND CANAL.** See CHINA.

**GRAND CANYON OF THE COLORADO.** There is one natural spectacle that never disappoints the traveler when he first gazes upon it. This greatest of scenic marvels is the Grand Canyon of the Colorado, the "divine abyss" which the Colorado River has cut for itself through the plateau region of Northwestern Arizona. The words *canyon*, *chasm*, and *gorge*, all of which are applied to it, create a mental picture of a steep-sided, narrow valley, on the more or less level floor of which a river flows; but the Grand Canyon admits of no such classification. It is  $21\frac{1}{2}$  miles in length, from one to eighteen miles wide, and over a mile deep, and the turbulent river which twists and winds through its depths is so far below that scarcely a murmur from it reaches upward to the rim.

Since 1919 the Grand Canyon has been a national park, open to all without restriction. To try to describe it is to attempt the impos-



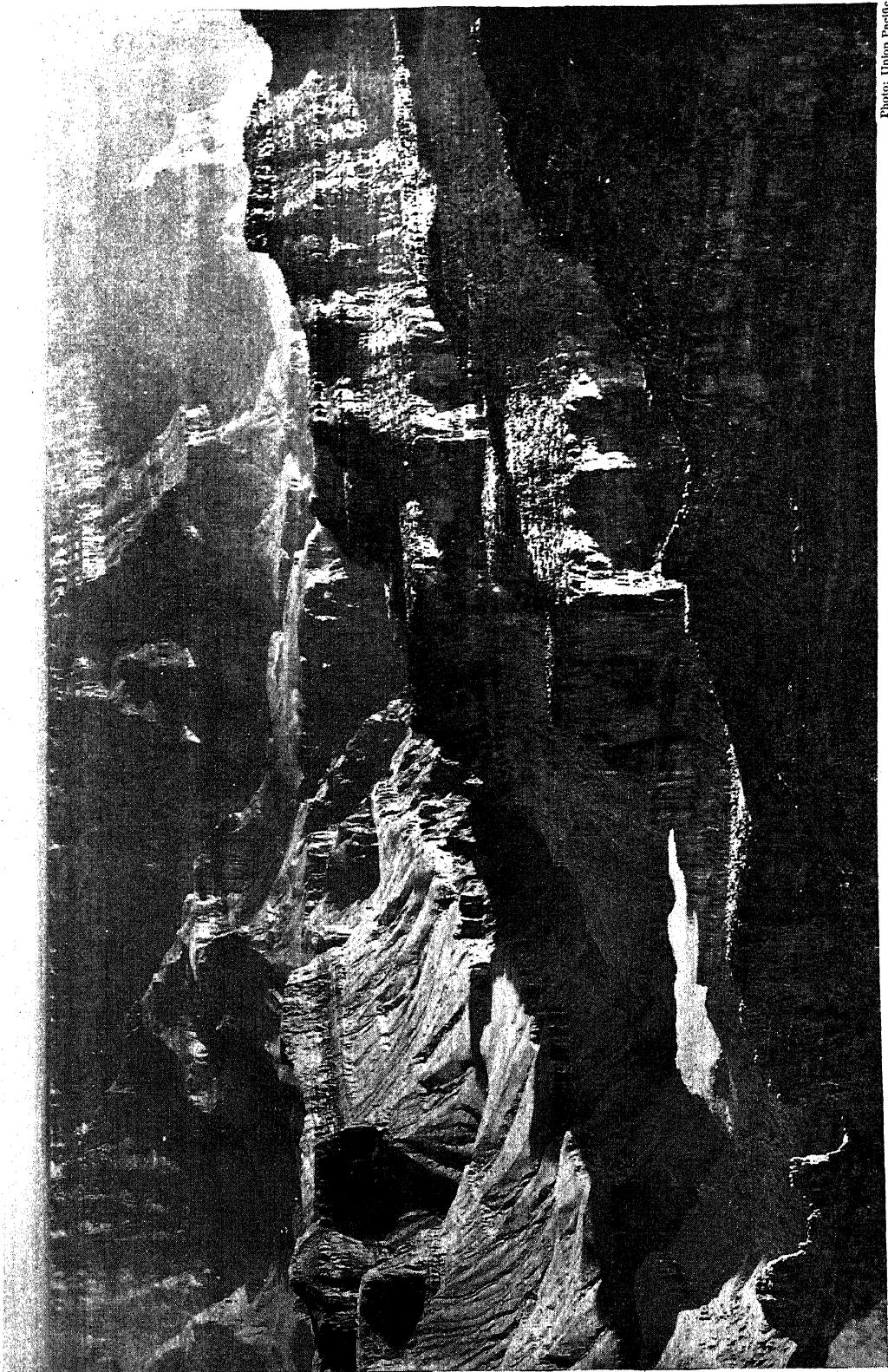
LOCATION OF THE GRAND CANYON

sible. "When the Creator made it," says one writer, "He made no adjectives to go with it." Even the faintest idea of its stupendous size, its wealth of coloring, and its riot of forms, majestic, grotesque, or beautiful, can be gained only from actual sight of it. The way to it is from the south, over a level, heavily wooded plateau, and no hint of the waiting wonders comes to the visitor until he stands upon the southern rim. Across from him, miles distant, but seeming close at hand in the clear atmosphere, is the farther rim, as straight and level as the horizon, while in between and on all hands stretch craggy peaks, flat-topped mesas, steep valleys, terraced rocks, all glowing with the deepest, richest colors. Red, yellow, purple, white, brown, and black blend in some spots, and in others give place to sharply individual tones, the whole presenting a kaleidoscopic effect which no artist can hope to equal, and no writer can hope to describe.

As for the rock formations—this "sublime city of Nature's building"—one geologist writes of them:

If any one of these stupendous creations had been planted upon the plains of Central Europe, it would have influenced modern art as profoundly as Fujiyama has influenced the decorative art of Japan. Yet here are hundreds of them swallowed up in the confusion of multitude.

Curiously like Oriental temples these structures look, with their rich color and their carved lines, and many of them have been christened with this resemblance in mind.



NORTH RIM OF THE GRAND CANYON

Photo: Union Pacific  
2895

So the canyon has a Temple of Buddha, a Temple of Isis, and a Temple of Zoroaster.

The visitor need not content himself with viewing the canyon from the rim, for two trails, the Hermit and the Bright Angel, give access to the depths. Every turn in their winding discloses new views, and every hour in the day develops its own special beauties of light and shade. To the very bed of the river these trails lead, and the visitor in four hours may reach the depth which it has taken the river countless ages to attain. The visitor who has stayed near the canyon long enough to recover from his first wordless amazement, and to form a real impression, is likely to speak of it thereafter either in carefully tempered words or in terms so glowing that to the uninitiated they seem overdrawn. One writer of this latter tendency has been more successful than many others in summing up the true spirit of the canyon:

A labyrinth of huge architectural forms, endlessly varied in design, fretted with ornamental devices, festooned with lacelike webs formed of talus from the upper cliffs, and painted with every color known to the palette, in pure, transparent tones of marvelous delicacy. Never was picture more harmonious, never flower more exquisitely beautiful. It flashes instant communication of all that architecture and painting and music for a thousand years have striven to express. It is the soul of Michelangelo and of Beethoven.

There are comfortable accommodations, reasonably priced, for railway tourists, automobile camps for motorists, and guides and burros for those who wish to explore the canyon's depths. See ARIZONA (The Land and Rivers).

**GRAND COTEAU, *ko toh'*, DES PRAIRIES.** See CANADA (Physical Characteristics: The Interior Plains).

**GRANDEE**, a member of a highly privileged class of nobility in Castile, Spain, since the thirteenth century, including the royal family. The rights were hereditary. Ferdinand and Isabella deprived the grandes of most of their privileges, and Joseph Bonaparte, acting for his famous brother, abolished them altogether. Their status was partly restored later, and grandes still are members of the Spanish Senate.

**GRAND FALLS.** See HAMILTON RIVER.

**GRANDFATHER GRAYBEARD.** See DADDY-LONG-LEGS.

**GRANDFATHER'S CLAUSE, THE.** The Fifteenth Amendment to the Constitution of the United States, adopted in 1870, conferred the right to vote upon the recently emancipated slaves, the vast majority of whom were not fitted for this important duty. After some years of experience, many of the former slaveholding states adopted amendments to their state constitutions, enabling them virtually to

annul or greatly abridge the provisions of this amendment.

Such amendments provided for a strict registration, with educational tests, such as ability to read and explain any article in the Constitution. That the right of suffrage might be taken from illiterate negroes, but not from illiterate white men at the same time, some states provided that the test of illiteracy should not apply to those who had descended from, or were the descendants of, those who had enlisted as soldiers in any war. This of course only included whites; illiterate negroes would have to pass the educational test, and very few of them could do so. In a few instances, it was provided that those entitled to registration should be only those whose ancestors had the right to vote in 1867. Any such clause has received the general name of "grandfather's clause." See ALABAMA (Government); LOUISIANA (Government).

**GRAND FORKS, N. D.** See NORTH DAKOTA (back of map).

**GRAND ISLAND, NEB.** See NEBRASKA (back of map).

**GRAND ISLAND COLLEGE.** See NEBRASKA (Education).

**GRAND ISLE.** See VERMONT (The Land).

**GRAND JURY.** See JURY AND TRIAL BY JURY.

**GRAND LAMA, *lah' mah.*** See TIBET (Government).

**GRAND MAL.** See EPILEPSY.

**GRAND MONARCH.** See LOUIS (XIV, France).

**GRAND MUFTI, *muf' te.*** See SHEIK.

**GRAND OLD MAN.** See GLADSTONE, WILLIAM E.

**GRAND OPERA.** See OPERA.

**GRAND-PRE, *grahN pra'*,** a beautiful village in Kings County, Nova Scotia, on the Basin of Minas, fifteen miles from Windsor. The French settlers there were expelled in 1713, by order of the English, at the close of what is known as Queen Anne's War. It is of this incident that Longfellow tells in his *Evangeline*, though not with historical accuracy (see, also, illustration in the article LOUISIANA). Grand-Pré is immortalized in the following lines.

This is the forest primeval; but where are the hearts  
that beneath it  
Leaped like the roe, when he hears in the woodland  
the voice of the huntsman?  
Where is the thatch-roofed village, the home of  
Acadian farmers,—  
Men whose lives glided on like rivers that water the  
woodlands,  
Darkened by shadows of earth, but reflecting an  
image of heaven?  
Waste are those pleasant farms, and the farmers for-  
ever departed!  
Scattered like dust and leaves, when the mighty  
blasts of October

Seize them, and whirl them aloft, and sprinkle them  
far o'er the ocean  
Naught but tradition remains of the beautiful village  
of Grand-Pré

**Related Subjects.** The reader is referred in these volumes to the following articles:

|            |                        |
|------------|------------------------|
| Acadia     | French and Indian Wars |
| Evangeline | Nova Scotia            |

**GRAND RAPIDS, MICH.**, the county seat of Kent County, is popularly called the "Furniture City," because of the outstanding importance of its principal industry. The city is situated on the Grand River, thirty miles from Lake Michigan, in the southwestern part of the state. Lansing and Detroit are, respectively, sixty and 145 miles southeast, and Chicago is 189 miles southwest. The Grand River descends here eighteen feet in the course of a mile, a circumstance which gave the city its name. Some of the power required by the many industries is furnished by means of a dam. The river is crossed by a number of bridges, some constructed of concrete. Below the rapids, the stream is navigable to a slight degree, but lake commerce for the city has its terminus at Grand Haven, the nearest port. Population, 1928, 164,200 (Federal estimate).

**Transportation.** Freight and passenger service is provided by the Pere Marquette, the Michigan Central, the New York Central, the Grand Trunk, and the Pennsylvania (G. R. & I.) railroads. Interurban electric lines and motorbus lines operate to Muskegon and other lake-shore towns, some of them through Kalamazoo and across the state to Detroit.

**Industry and Trade.** The city was formerly the furniture capital of America, but has been placed below New York and Chicago. Lumber for this product is shipped to Grand Rapids from all parts of the globe, but the output is purchased chiefly in America. Next in value of product is the manufacture of automobile bodies, and this industry is followed by the manufacture of church pews, opera chairs, and school seats. The city also is a leading center for the manufacture of sticky flypaper, ball-bearing window-sash pulleys, metal belt lacers, carpet sweepers, show cases, gypsum products, folding paper boxes, excelsior, and refrigerators. There are over a hundred manufacturing plants interested in the export or import trade.

Grand Rapids is centrally located in the great Western Michigan fruit belt, and is an important shipping point for fruit, grain, and vegetables produced in the surrounding country. Important among the fruits grown are peaches, apples, cherries, plums, pears, and small berries. Chicago, Cincinnati, Saint Louis, and even New York buy winter lettuce in Grand Rapids. One very popular variety of winter lettuce which originated here has been given the name of the city.

**Education and Institutions.** The educational institutions include the Calvin College (one of the important schools of the Dutch Reformed parochial system), three senior high schools, a junior college, and private schools and business colleges. Grand Rapids is the seat of Roman Catholic and Protestant Episcopal bishoprics. The city takes pride in the

fact that there is a playground within one-half mile of the home of every child. Overlooking the river, about one mile north of the city, is the Michigan Soldiers' Home; three miles east is the Michigan Masonic Home.

**History.** Grand Rapids was settled in 1826 by Louis Campau, on the site of an Ottawa Indian village. It was incorporated as a village in 1837, and as a city in 1850. The city now covers an area of twenty-two and one-half square miles.

**GRAND REMONSTRANCE**, a document addressed to Charles I of England by the House of Commons in 1641, setting forth the grievances which they held against him. The outbreak of the Irish rebellion and the rumored intrigues of the king with the Earl of Montrose incited the Puritan party to call him to account. On November 22, while the king was in Scotland, the Commons adopted the Grand Remonstrance by a majority of eleven, after a heated debate. The document enumerated acts of misgovernment extending over the king's entire reign, such as the levying of forced loans and the abuses of the court of Star Chamber (which see).

Charles I ridiculed the Remonstrance and refused to take it seriously. On December 10 he issued a proclamation on religion as an indirect reply, and on December 23 sent an evasive answer to the manifesto. On January 3, 1642, he sent his attorney-general to impeach the five leaders of the Opposition responsible for the Remonstrance before the House of Lords. This act was one of the causes of the civil war in England which resulted in the execution of the king in 1649 and the establishment of the Commonwealth, under Oliver Cromwell. See COMMONWEALTH OF ENGLAND.

**GRAND RIVER.** See MICHIGAN (Its Rivers).

**GRAND RIVER.** See SOUTH DAKOTA (Rivers and Lakes).

**GRAND SACHEM.** See TAMMANY SOCIETY.

**GRAND SLAM.** See BRIDGE (game).

**GRAND TETON,** *te' ton.* See YELLOWSTONE NATIONAL PARK; PARKS, NATIONAL.

**GRAND TRIANON.** See VERSAILLES.

**GRAND VIZIER.** See VIZIER.

**GRANGE**, *granje*, the popular name for the Patrons of Husbandry, a secret order in the United States, which was organized in the interests of agriculture but which developed political power because of its numerical strength. It is open to men and women alike. In 1866 the government commissioned a member of the staff of the then Bureau of Agriculture to report on agricultural conditions in the South and to devise means of improving them. He found the farmers very poor, backward, and discouraged. In December, 1867, he founded the National Grange of Patrons of Husbandry,

because he felt that some form of organization would unite and help the farmers.

The local bodies were called *granges*, and each state had its state grange. In 1873 there were over 10,000 granges in the United States, and in 1875 its membership of 1,500,000 was distributed through every state in the Union. Following this peak of popularity, the Grange passed through a period of decline, but about 1890 it began to take on new life. State granges now maintain organizations in over thirty states, and there are about 800,000 members.

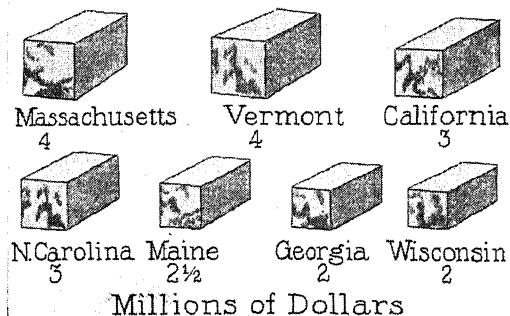
The influence of the Grange was potent in reducing railroad rates, abolishing trusts, futures, etc. Its most important fruits were the organization of the Department of Agriculture, the act for founding experiment stations, and the establishment of the Interstate Commerce Commission. The political element finally took separate shape under the Farmers' Alliance, the Populist Party, and the Non-Partisan League.

**GRANITE**, one of the most widely known and popular building stones, is crystallized rock, composed essentially of three common minerals—quartz, feldspar, and mica—each of which is easily distinguished in the rock. Take a piece of granite and examine it carefully. One part looks like glass; this is the *quartz*. Surrounding the glasslike particles is a substance with a pearly luster; this is the *feldspar*. This is usually of two kinds, orthoclase and plagioclase, the former in excess. Scattered all through the rock are flat, shiny crystals that can be split with a knife-blade into very thin pieces; these crystals constitute the *mica*. Other minerals may be present in smaller amounts, such as magnetite, apatite, titanite, zircon, and others. In some varieties of granite, hornblende or pyroxene takes the place of the mica.

We usually think of granite as a gray rock, but it may be of almost any color, from nearly white to black. When both the feldspar and the mica are white, the granite is a light gray. If the mica is black, we have a dark gray. If the feldspar is of any shade of red, we have a red granite. If the feldspar is colored green by chlorite, the granite is greenish in tint.

Granite is extensively used in the construction of buildings, for piers of bridges, walls of dams, and wherever great strength and durability are required. It has also almost entirely replaced marble for headstones and monuments. It takes a high polish, and is one of the most beautiful stones used in the arts. It weighs about 167 pounds to the cubic foot, and will withstand a pressure of from 15,000 to 20,000 pounds to the square inch without crushing. It is more difficult to quarry and work than limestone or sandstone, but the invention of stone-cutting machinery now makes it available for all purposes. The front

of one of Chicago's largest structures, the building of the Peoples Gas Light and Coke Company, contains eighteen massive granite



AVERAGE ANNUAL PRODUCTION OF GRANITE

The comparative value from each of the leading states is given emphasis by means of the graphic illustrations.

columns, highly polished, each weighing, thirty-one tons and costing \$10,000.

There are valuable quarries in British Columbia, Quebec, and Nova Scotia. Bunker Hill Monument is built of Quincy, Mass., granite, and the Grant Monument, on Riverside Drive, New York City, is of granite quarried in Wisconsin. Vermont produces every known variety except red granite. New Hampshire's rugged granite mountains have given it the popular name of "Granite State." See NEW HAMPSHIRE.

In some varieties, quartz is lacking; these are called *syenite* by geologists, but quarrymen and builders call them granite. The name comes from that of Syene, Egypt, where the ancient Egyptians quarried this rock for their pyramids, statues, and temples. When the mica forms in layers, the granite is called *gneiss*.

Granite was once in a molten state. When it cooled, the minerals crystallized as we now see them in the rock. Granite has been formed at different geologic periods in the world's history, but because it was formed deep within the earth, and is only exposed to view after long years of erosion, most of the rock we now see at the surface is very old.

A.J.

**Related Subjects.** For comparison of durability of granite and other stone, see BUILDING STONE. The reader is also referred in these volumes to the following articles:

|          |              |        |
|----------|--------------|--------|
| Feldspar | Gneiss       | Mica   |
| Geology  | Igneous Rock | Quartz |

**GRANITE, ILL.** See ILLINOIS (back of map).

**GRANITE PEAK.** See MONTANA (Physical Features).

**GRANITE STATE**, a popular name applied to New Hampshire (which see).

**GRAN QUIVIRA**, *grahn ke've' rah*, NATIONAL MONUMENT. See NEW MEXICO (National Monuments); MONUMENTS, NATIONAL.

**GRAN SASSO D'ITALIA**, *grahn sahs' so de tah' lyah*. See APENNINES.

**GRANT**, FREDERICK DENT (1850-1912), eldest son of Gen. Ulysses S. Grant and himself acquainted with army life before he was thirteen years of age. During the last years of the War of Secession, he accompanied his father in the latter's campaigns, and in 1867 entered West Point Military Academy, from which he was graduated in 1871. He worked as an engineer on the Union Pacific Railway, and from 1873 to 1879 was lieutenant colonel on Sherman's staff in numerous expeditions against the Indians. He resigned from the army in 1881, was United States minister to Austria from 1889 to 1893, and was police commissioner of New York City for four years.

At the outbreak of the Spanish-American War, Grant was appointed colonel, then brigadier general of volunteers, and saw service in Cuba and the Philippines. In 1901 he was appointed brigadier general in the regular army and in 1906 major general. He was at various times in command of the military districts of Southern Luzon, Northern Luzon, the Depart-

ment of Texas, Department of the Lakes (at Chicago), and Department of the East (New York City). He was in command of this last department at the time of his death.

**GRANT**, ROBERT (1852- ), an American writer whose *Unleavened Bread*, a "problem" novel of the less unpleasant type, was one of the popular books of its year. Grant was born in Boston and studied at Harvard, receiving his doctor's degree and graduating in law from that institution. He began to practice law in his native city in 1879, and from the first was successful. In 1888 he was made a water commissioner for Boston, and five years later was appointed judge of the Probate Court and of the Court of Insolvency for Suffolk County, Mass. This post he held until 1923. He married a daughter of Sir Alexander T. Galt of Montreal, in 1883.

**His Books.** Judge Grant's works include, in addition to the novel mentioned above, *The Undercurrent*, *The Bachelor's Christmas*, *The Orchid*, *The Chippendales*, *The High Priestess*, *Law and the Family*, *The Bishop's Granddaughter*, and *Occasional Verses*.



**G**RANT, ULYSSES SIMPSON (1822-1885), an American soldier and statesman who achieved his great fame as commander-in-chief of the Federal armies during the last year of the War of Secession, when he directed the final campaigns of that terrible struggle. With a singleness of purpose and an unyielding determination that wore out the defense of his opponents, Grant hammered his way to a victory which preserved the union of the states. The keynote of his military career is revealed in the message which he sent to Washington from the battlefield of Spottsylvania, where for two weeks, in 1864, the Confederate armies had held Grant's forces in check: "I propose to fight it out on this line, if it takes all summer." In 1868 the country elected him to the highest civil office in the United States, the Presidency, and re-elected him four years later.

Grant was born on April 27, 1822, at Point Pleasant, Clermont County, Ohio. His father, Jesse Grant, was seventh in descent from Matthew Grant, a Scotsman who was one of the original settlers of Dorchester, Mass., in 1630, and was one of the founders of Windsor, Conn., in 1635. Noah Grant, grandfather of Ulysses, fought in the Revolutionary War, and at its

close migrated, first to Pennsylvania and later to Ohio. Jesse Grant, the father of Ulysses, was a tanner by trade, and at one time was in the employ of Owen Brown, the father of John Brown of Osawatomie. In 1822, when Ulysses was born, Jesse Grant was in business for himself at Point Pleasant, but in the next year the family removed to Georgetown, about forty miles southeast of Cincinnati. Here Ulysses spent his boyhood, working on his father's farm in summer and attending school in winter. His father, ambitious for his son's advancement, secured for him in 1839 an appointment to West Point, where Ulysses was graduated in 1843.

It was at West Point that Grant adopted the name "Ulysses Simpson." He had been baptized Hiram Ulysses, but was known to his family and friends as Ulysses. The member of Congress who appointed him to the military academy thought that Ulysses was his first name, and that his middle name was probably that of his mother's family, Simpson. The appointment to West Point was therefore made in the name of Ulysses Simpson Grant. The West Point officials were notified of this mistake by the new cadet, but they did not feel

authorized to correct it. Ulysses Simpson he was on the rolls, and Ulysses Simpson he remained to the end of his days.

At graduation, in 1843, he was appointed second lieutenant and assigned to duty at Saint Louis. In the autumn of 1845, with his regi-



Photo: U & U

ULYSSES SIMPSON GRANT

A man who was almost a failure until "he found his work."

ment he joined the army of occupation in Texas, and during the Mexican War took part in every important battle except that of Buena Vista. He was brevetted first lieutenant for conspicuous service at Molino del Rey, and was brevetted captain for bravery at the storming of Chapultepec. For several years after the close of the war, he was assigned to garrison duty in various parts of the United States. In the meantime, August 28, 1848, he had married Miss Julia Dent, the sister of a West Point classmate; but when he was detailed to duty in California, his wife and children remained in Saint Louis. Two years of separation from his family and the seemingly endless prospect of garrison life led him to resign his commission on July 31, 1854.

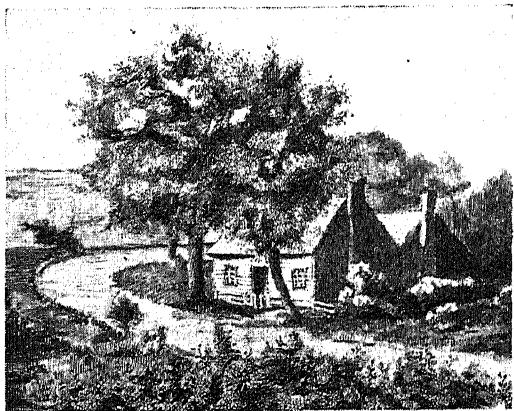
Returning to Saint Louis, Grant settled with his family on a sixty-acre tract which his father-in-law set aside for them. Here, for nearly

four years, Grant lived the life of a farmer. With his own hands he built a log cabin, which he called "Hardscrabble." He cleared the land, plowed and hoed, hauled wood to the mines, and worked hard all the time. But his efforts met with little success, and in May, 1860, he took his family to Galena, Ill., where he became clerk in a leather and hardware store owned by his father. He was thus employed when the War of Secession broke out—the event which so completely changed his prospects.

It is the truth, and no reflection on his abilities as proved at a later time, that in 1861 Grant was regarded by his family and friends as a broken man. He was nearly forty years old, he had tried first one occupation and then another, and had been successful in none. His army career had started well enough, but apparently wasted into nothing. As a farmer, he had been barely able to make a living on land which cost him nothing, and some real-estate dealings by which he hoped to improve his financial affairs turned out badly. In 1861 his younger brother, who managed the Galena store, felt that the services of the future President were worth only \$15 a week.

#### His Great Military Service

**In the War of Secession.** Immediately after the commencement of hostilities, he offered his services to the national government, but received no reply to his letter. Meanwhile, he was acting as mustering officer of the Illinois



HIS BIRTHPLACE

volunteers, and in June was chosen colonel of the Twenty-first Illinois regiment of infantry. After several months, he was made brigadier general of volunteers, and was given command of the district of Southeastern Missouri, with headquarters at Cape Girardeau. Learning that Confederate forces were about to seize Paducah, Ky., at the junction of the Tennessee and Ohio rivers, he occupied the city on his own initiative, and thus prevented

the enemy from gaining a foothold in Western Kentucky. His first battle as a commander was at Belmont, Mo., where he showed himself a capable leader, though he achieved no material advantage. Early in 1862, he saw the

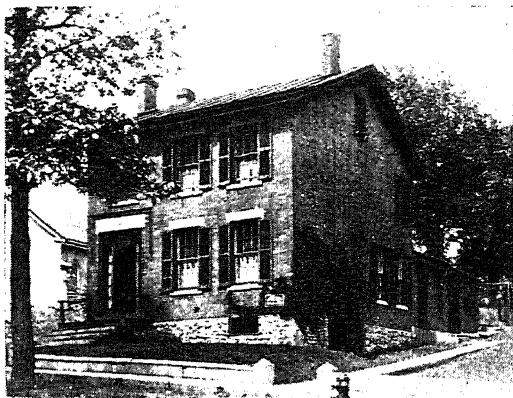


Photo: U &amp; U

## THE GRANT HOME IN GALENA

The residence shown above was occupied by the future general and President before the War of Secession. Another building in Galena has been set aside as a memorial to the family.

strategic importance of Fort Henry and Fort Donelson (which see), and after much pleading for permission, was allowed to undertake the campaign which ended with the capture of those forts. His reward was promotion to the rank of major general of volunteers. It was at Fort Donelson that Grant won his nickname, "Unconditional Surrender." When General Buckner, in command of the Confederate forces, asked that commissioners be appointed to arrange terms for surrender, Grant replied: "No terms other than unconditional and immediate surrender can be accepted. I propose to move immediately upon your works." The public appreciated its own little joke, and Grant's initials, "U. S." were said to stand for "unconditional surrender."

Although Grant was now famous, and faith in his leadership was high, he was soon

in difficulty. About this time he quarreled with General Halleck, his chief, and was virtually placed under arrest. He was allowed to keep his command, however, and at the Battle of Shiloh just managed to save his army from annihilation. At Shiloh Grant displayed great bravery, but did not seem quite equal to all emergencies. At any rate, Halleck thought so, and made Grant second in command of the combined armies of the Tennessee and the Ohio, a nominal command which had no important duties and which the army regarded as indicating that Grant was in disgrace. Grant's fortunes were to sink but one step lower, with the collapse of the first campaign against Vicksburg, before they turned. The defeats before Vicksburg in December, 1862, were relatively unimportant, but they led many well-intentioned persons to believe that Grant was unfitted for command. There were rumors, too, that he was frequently intoxicated, and there is little doubt that he would have been forced into retirement had it not been for Lincoln's firm support. Lincoln seems to have recognized Grant's ability at an early date, and deliberately disregarded all rumors, true or false, about him. The following story in this connection was given wide publicity; its authenticity has been questioned. On one famous occasion, when a committee called on him to demand Grant's removal for intoxication, Lincoln jokingly asked the critics to find out what brand was Grant's favorite, so that kegs of it might be sent to the other Union generals.

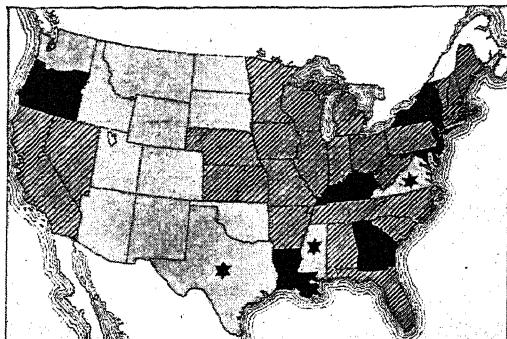
Lincoln's faith in Grant was finally vindicated by the successful end of the Vicksburg campaign. After the surrender of the forts on July 4, 1863, Grant was made a major general in the regular army, and several months later took command of a great army at Chattanooga. In the battles around Chattanooga, in November, 1863, he destroyed the foothold of the Confederacy in the center and west. It remained only to destroy its power in the east.

To this end, Grant was then made commander in chief, with the rank of lieutenant



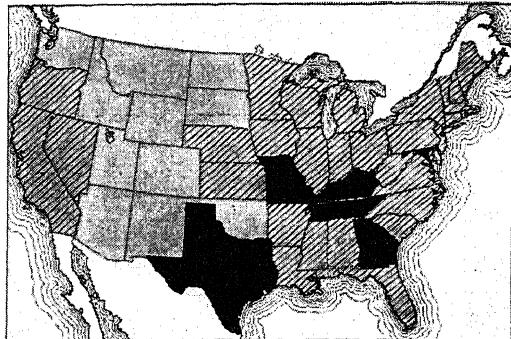
Photo: Visual Education Service

IN THE MEXICAN WAR  
Lieutenant Grant aiming a cannon at the Battle of Chapultepec.



1868

## GRANT'S TWO ELECTIONS



1872

The shaded states are those that gave their electoral votes to Grant; the black-colored states supported the Democratic ticket; the white areas represent non-voting territories. In the election of 1868 Virginia, Mississippi, and Texas (starred on the above map) did not participate in the Presidential election, for until 1870 they did not comply with Federal requirements which had been imposed upon the states of the former Confederacy.

general, of all the Federal armies in the field, and made his headquarters with the Army of the Potomac. From this time to the end, the war in the east was a series of almost continuous battles. Grant never relaxed his hold, and in spite of occasional checks and partial defeats, pursued his policy of wearing his opponents down. His relentless campaign for Richmond, though carried on with a sacrifice of life which would have disheartened a less determined commander, had its inevitable result in the surrender of the heroic Lee at Appomattox Court House, on April 9, 1865.

**His Fame as a Soldier.** Grant was a great commander, and few soldiers of any country are his peers. Yet it is not fair to say that Grant was a great soldier born. Personally courageous and daring almost to a fault he was, but he learned the art of campaigning in the bitter school of experience. The buoyant, energetic Grant who fought at Shiloh was not the same grim figure which led the way from Vicksburg to Appomattox. After all, it is immaterial whether Grant originally possessed the needed qualities or whether he acquired them, but the fact is that he did have the energy, the judgment, and singleness of purpose to carry his task to its conclusion. McClellan had greater *finesse*, Rosecrans was more brilliant, and Buell was more exact and careful, but none of these Federal generals seemed to combine these qualities in the right proportions.

**Peace and Politics.** After the death of Lincoln, President Johnson and others in authority showed a disposition to treat the Confederate leaders with severity. Indictments for treason were brought against Lee and several others, in absolute disregard of the terms of surrender. Grant protested against this breach of faith, and even threatened to resign from the army if the President did not heed his protest. In

1866 Grant was promoted to the rank of general, a grade higher than any other American soldier, not excepting Washington, had held before him. In 1867, after President Johnson had suspended Secretary of War Stanton, Grant was appointed to succeed him, but he was only too glad to resign when the Senate refused to confirm the President's action. His eagerness to keep out of the controversy between Congress and the President led to bitter feeling between him and Johnson, and brought Grant into politics in spite of himself.

Grant had never taken any interest in politics; in fact, he had only voted at one Presidential election, that of 1856, when he cast his ballot for Buchanan. In 1868, politically considered, he was an unknown quantity. A number of leading Democrats even approached him with a proposal to make him the Democratic nominee for President, but the effect of his quarrel with Johnson had been to bring him into closer touch with the Republicans in Congress. He was, moreover, in general accord with the Republicans on the tariff, the national banking system, and internal improvements. He was unanimously nominated by the Republican convention on the first ballot, and was elected by the large majority of 214 electoral votes to eighty for Horatio Seymour, the Democratic candidate.

### Grant, the President

**His Administration (1869-1877).** When Grant took office as the eighteenth President, he fell heir to a reconstruction policy only partly carried out. The Fifteenth Amendment to the Constitution, which guaranteed the right of suffrage without regard to "race, color, or previous condition of servitude," was passed by Congress before Grant became President. It had his active support, however, from the beginning, and when it was ratified

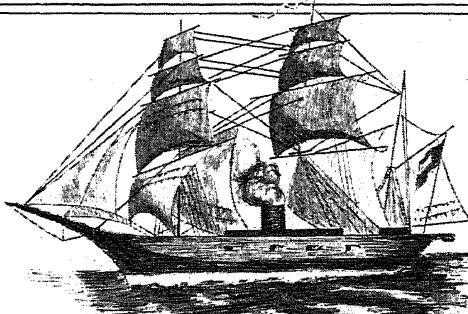
# GRANT'S ADMINISTRATION

1869

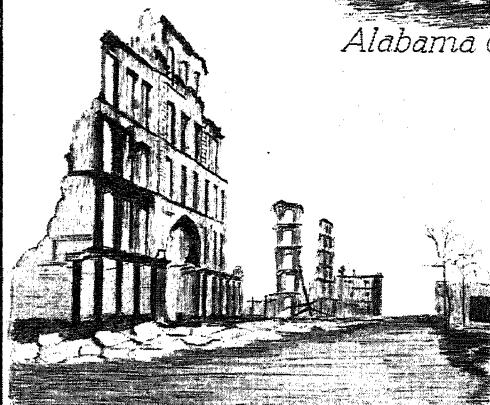
1877

COLORADO

Admitted to the Union in 1876



Silver demonetized



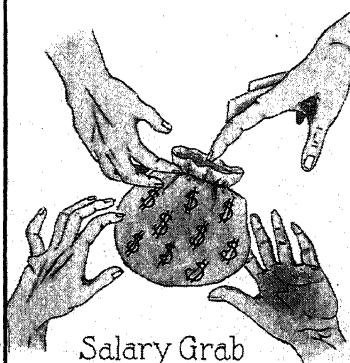
Alabama claims adjusted

Memorial Building



Centennial Exhibition, 1876

After the Chicago Fire, 1871

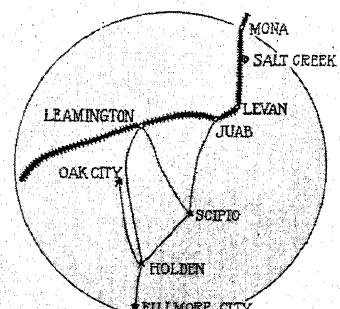


Salary Grab

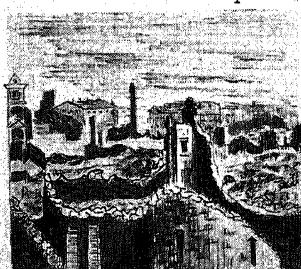


Custer's death, 1876

First issue of one-cent postal cards in 1876



Star Route frauds exposed



After the Boston Fire

and declared in force, March 30, 1870, he pronounced it "a measure of greater importance than any other one act of the kind from the foundation of the government to the present day." Meanwhile, reconstruction was not proceeding satisfactorily, and conflicts between the negroes and their late masters became so frequent and violent that Congress, at the President's request, passed the Force Acts, which authorized the President to suspend the writ of *habeas corpus* in any district and to declare martial law. When repeated warnings did not bring about the desired results, Grant used these extraordinary powers in parts of North and South Carolina, and even instituted prosecutions against several prominent offenders, with the result that a measure of quiet was restored.

The President also intervened in a number of contested elections in the South, and sent Federal troops to support the Republican candidate. In these instances, many people felt that the President had acted with unnecessary harshness. In May, 1872, the reconstruction policy, so odious to the South, was modified by the passage of the Amnesty Act, restoring civil rights to all but about 300 persons in the South; this marked the beginning of the end of "carpetbag" rule.

**Vigorous Foreign Policy.** During the election campaign, Grant had given little indication of the policies he would pursue if elected, but he had the confidence of the public, which was increased by the speedy negotiation of the Treaty of Washington and the settlement of the Alabama Claims. In one respect, however, the President's policy failed to meet general approval. In 1869 the government of Santo Domingo sought annexation to the United States. Grant was heartily in favor of this step, and tried for several years to bring it about, but the United States Senate finally refused to approve the treaty of annexation. In another West Indian island, Cuba, an insurrection had been going on for several years, and American citizens and ships in Cuban territory had occasionally been detained by the Spanish authorities, on the pretense that they were aiding the insurgents. The climax of these seizures was the Virginian massacre, which created intense excitement in the United States and almost led to war. Grant, however, by acting with firmness and promptness, won from Spain a complete apology and full reparation for the outrage.

**Election of 1872.** Chiefly as the result of the administration's policy toward the South, a considerable faction in the Republican party felt that Grant's reelection would be a calamity. This faction, led by Charles Francis Adams, Carl Schurz, Charles Sumner, and Horace Greeley, organized the Liberal Republican party at a convention in Cincinnati in May,

1872. The original intention was to nominate Adams for President, but the convention was stampeded for Greeley, who was still unpopular in the North for his act in signing Jefferson Davis's bail bond. The Democrats accepted Greeley as their candidate, while the Republicans renominated Grant. Grant was elected by a popular vote of 3,597,000 to 2,834,000 for Greeley. Grant received 286 electoral votes to 63 votes for Thomas A. Hendricks, B. Gratz Brown, and the other candidates, Greeley having died before the electoral college met.

**Financial Legislation and the Panic of 1873.** Early in 1873, Congress passed a coinage act which received little attention at the time. Neither gold nor silver was in circulation; the government had not resumed specie payments, and the only currency consisted of bank notes and "greenbacks." This act dropped the silver dollar from the list of standard coins, a procedure which was denounced a few years later as the "crime of 1873." When the act was passed, no silver dollars had been coined for twenty years, and it was not until later, when the free-silver agitation swept the country (1896), that great political capital was made of the act of '73.

Another noted fiscal law of 1873 is known in history as the "salary grab." The act raised the salary of the President from \$25,000 to \$50,000, and increased the salaries of all Federal judges and of members of Congress, including the members of the Congress which passed the bill. This last feature was violently opposed by the public, which expressed its indignation so forcibly that so much of the act as related to Congressmen's salaries was repealed.

The "salary grab" was merely an incident in a time of riotous wastefulness which could have but one end. Overproduction, overtrading, and overexpansion of credit led to one failure after another among the banking houses of New York, until the country was seized with panic. Credit was refused, savings banks suspended payment, factories shut down and their owners were driven into bankruptcy, and many of the railroads were forced into the hands of receivers. To relieve the money stringency, Congress passed the so-called Inflation Bill, providing \$100,000,000 in inconvertible paper currency. Grant vetoed the bill, a courageous act for which the country owes him a great debt, and largely through his efforts and those of John Sherman, then Senator from Ohio, Congress passed an act for the resumption of specie payments.

**Scandal and Corruption.** For nearly half a century the United States had seen more or less corruption in high places, but Grant's administration seems to have been selected by some evil genius as the time for the worst



Photo: U & U

**Tomb on Riverside Drive.** It faces south, with the Hudson River many feet below, at the left. In an open circular vault a dozen feet below the marble floor of the main room, over which a subdued purplish light is diffused, lie side by side the President-General and his wife, Julia Dent Grant. In small adjoining rooms are preserved mementos of the period of the War of Secession.

disclosures. Unfortunately for Grant's reputation, both then and now, his praiseworthy actions were sometimes overshadowed by the faults of his subordinates. One of Grant's most lovable traits was a simple trust in his friends; he found it impossible to think evil of any man to whom he had given his friendship. It was his misfortune that some of his friends took an ignoble advantage of his trust. The affair of the Credit Mobilier, the Whisky Ring, and the Star Route Frauds, although these last were not exposed until the Hayes administration, were but typical of the existing laxness of morals. In New York City, the Tweed ring was finally broken up in 1871, but in 1876 Grant's Secretary of War, W. W. Belknap, resigned to avoid impeachment for selling contracts for army supplies. Fraud was discovered in the customs service and in the Indian Bureau. Grant had made at least one attempt to reform the government service; he had secured the Civil Service Act of 1871, but two years later, Congress blocked further reform by refusing to appropriate funds.

**Other Items of Interest.** One of the most noteworthy features of Grant's term was the sudden rise of the "Grangers," or "Patrons of Husbandry." Equally interesting was the first appearance, in 1876, of a national Prohibition party. In 1873 Congress passed a law ordering the issue of the first one-cent postal cards, and in 1876 admitted Colorado to the Union. The year 1876 also marked the completion of the first century of American independence, and was fittingly celebrated by a great Centennial Exposition at Philadelphia. Two of the exhibits there were recent inventions, then still regarded as of little practical value—the incandescent electric light and the Bell telephone.

During the eight years of Grant's Presidency, the United States was at peace with the rest of the world, but within its own borders there was savage warfare. In 1871 and 1872, the Apache Indians in Arizona and the Modoc Indians in California were on the warpath, and in 1876 the Sioux Indians, led by Sitting Bull, massacred gallant General Custer and his entire force in Montana Territory. The Chicago fire of 1871 and the Boston fire of 1872 were disasters of a different kind. During the closing months of Grant's term, the great issue before the people was the contested Presidential election, full details of which are given in the article on Rutherford B. Hayes.

**Around the World and Home Again.** In May, 1877, just two months after the inauguration of his successor, Grant started on a trip around the world, in company with his wife and eldest son, Frederick. He sailed from Philadelphia to Liverpool, and visited the British Isles and the great cities of continental Europe. From Marseilles he went to Egypt

and the Holy Land, thence to India, China, and Japan, and finally back to America at San Francisco, where he landed in September, 1879. Everywhere he was enthusiastically received, not merely as a former President of the United States, but as one of the greatest soldiers of modern times.

In 1880 a determined attempt was made to nominate Grant for a third term, but he himself took no part in the campaign. Soon afterward he removed from his old home at Galena, Ill., to New York, where he invested all his capital in the banking firm of Grant & Ward, in which his son was a partner. The mismanagement of the junior partner brought the firm to bankruptcy, and left the General, then sixty-two years old, penniless. To help support himself, he wrote a series of magazine articles on his principal campaigns. These were so successful that they led several publishers to make handsome offers for his personal memoirs, the story of his life to the end of the War of Secession. When he realized that he was suffering from cancer, he redoubled his efforts to finish the book, and the last word was written only four days before his death, which occurred on Mount McGregor, near Saratoga, N. Y., on July 23, 1885. His body now lies in a great tomb on Riverside Drive, New York City; this tomb was paid for by popular subscription, and was dedicated by President McKinley on April 27, 1897. E.D.F.

**Julia Dent Grant** (1826-1902), daughter of Judge Frederick Dent of Saint Louis, met young Ulysses Grant when he was her brother's classmate at West Point, and was married to him in 1848.

The years which followed her husband's resignation from the army in 1854 were difficult, for not only was her life full of work and anxious care for her four children, but she had also to face his own discouragement and the almost universal opinion that her husband was a failure. During the war, which made him famous, she paid several visits to his headquarters, but usually stayed with her children at her father's home.

The home life of the Grant family in the White House was delightful, as private and as simple as their official position could permit; Ulysses, Jr., Jesse, and Nellie were at home, while Frederick Dent was a student at West Point. Nellie's marriage at the White House to the English captain, Algernon Sartoris, attracted international attention. The official social life of the administration, reflecting the returning prosperity of the era, was more brilliant and elegant than that of any immediately preceding régime.



Photo: U & U

JULIA DENT GRANT

## OUTLINE AND QUESTIONS ON U. S. GRANT

### Outline

#### I. Years of Preparation

- (1) Birth and ancestry
- (2) Education
- (3) Service in Mexican War
- (4) Unsuccessful attempts at farming and at real-estate dealings

#### II. War of Secession

- (1) Early activities
- (2) "Unconditional Surrender"
- (3) Ebb of his fortunes
- (4) The Vicksburg campaign
- (5) Campaign for Richmond

#### III. His Administration—1869-1877

- (1) Reconstruction
  - (a) Fifteenth Amendment
  - (b) Force Acts
  - (c) Suppression of Ku-Klux Klan
  - (d) Intervention in local elections
- (2) Important legislation
  - (a) Civil Service Act, 1871
  - (b) Coinage Act, 1873
  - (c) Inflation Bill
  - (d) Resumption Act of 1875

- (3) Political corruption and financial disorders
  - (a) Credit Mobilier
  - (b) Whisky Ring
  - (c) "Salary Grab" Act
  - (d) Tweed Ring
  - (e) Panic of 1873

#### (4) Foreign affairs

- (a) Treaty of Washington
- (b) Alabama Claims settled
- (c) Virginian Massacre
- (d) Attempted annexation of Santo Domingo

#### (5) Other important events

- (a) Election of 1872
- (b) Election of 1876
- (c) Indian risings
- (d) Chicago and Boston fires
- (e) Bell telephone patented
- (f) Union Pacific Railway completed
- (g) Centennial Exposition

#### IV. Later Events

- (1) Trip around the world
- (2) Business losses
- (3) *Memoirs*
- (4) Death

### Questions

Give the origin of Grant's popular nickname.

How much larger was Grant's salary in 1871 than it had been ten years earlier?

What was the Ku-Klux Klan, and how did the administration deal with it?

What is there in the last years of Grant which reminds you of the last years of Sir Walter Scott?

What interesting fact shows Grant's complete lack of interest in politics?

Name two extremely important inventions which were brought before the public during this administration.

Why was Grant without a commission at the outbreak of the War of Secession?

When and why did he threaten to resign from the army?

When did Grant's firmness prevent a possible break with a country with which the United States did go to war twenty-five years later?

In what way would it have been better if Grant had not had such implicit faith in his friends?

What was Grant's real name, and why was he not known by it?

What was the "salary grab," and how was it changed because of public disapproval?

What famous saying of Grant shows the dominant trait in his character?

To whom did he owe his continuance in the army despite various failures?

In what way did his early life differ from that of Lincoln or of Garfield?

What was the chief significance of the battles around Chattanooga?

Mention one instance in which Grant used his veto power with good effect.

What gave rise to his financial difficulties?

Mrs. Grant survived the General seventeen years. She is buried beside him, in the memorial on Riverside Drive in New York City.

**Related Subjects.** The reader who desires additional information regarding this President and his times is referred in these volumes to the following articles:

|                       |                    |
|-----------------------|--------------------|
| Alabama, The          | Greeley, Horace    |
| Brevet                | Reconstruction     |
| Carpetbaggers         | Salary Grab        |
| Credit Mobilier       | Star Routes        |
| Custer, George A.     | Virginian Massacre |
| Grange                | War of Secession   |
| Washington, Treaty of |                    |

**GRANT LAND**, a part of Ellesmere Land, an island north of the mainland of North America, west of Greenland. It is desolate and barren.

**GRANULAR CONJUNCTIVITIS**, *kon junk-tee-vi' sis*. See GRANULATION; EYE.

**GRANULAR SNOW.** See HAIL.

**GRANULATION**, *gran u la' shun*, a healing process occurring in open wounds. The granulation consists of small pebbly masses of fleshy matter, which grow over the wound and assist in the gradual closing and healing. Sometimes the granulations are forced upward, beyond the surface of the wound. Such growth is commonly known as *proud flesh*, and differs greatly from the healthy granulations. Proud flesh is usually removed by the surgeon's knife, or treated with strong caustics. When a wound heals by granulation, it is called healing by *second intention*. Second-intention healing occurs when there is space to be filled in, or when the wound has become infective. The granulations are tufts composed of small young blood vessels and small beds of young tissue growing up to fill the space. See WOUNDS.

The term *granulation* is sometimes applied to lumps or sores appearing on the inner portions of the eyelids and on the eyeball itself. The scientific name for the disease in which these symptoms occur is *granular conjunctivitis*, but it is more commonly referred to as *granular*, or *granulated*, *eyelids*. One form of granular conjunctivitis is the contagious disease known as *trachoma*. It may be easily spread by carelessness in regard to towels and other toilet requisites. See BLINDNESS; EYE.

W.A.E.

**GRAPE**, the fruit of the vine, probably the first fruit cultivated by man. It was known to the Egyptians at least three thousand years ago, and among the ancient Greeks and Romans, its use was common. From the days of earliest history, the vine has been a favorite plant, not only on account of its delicious fruit and the wine it yields, but because of the grateful shade afforded by its climbing stems and large leaves. In the Bible we read that the Israelites dwelt in safety, each under his "vine and fig tree" (*I Kings iv, 25*), and how Pharaoh's cupbearer dreamed a dream concerning a vine (*Genesis xl, 9-11*). At the present day, the

grape is one of the most important of food fruits; it appears almost daily in some form in the diet of nearly all countries of the world. The earliest cultivated species was derived from the wild grape found on the eastern coasts of the Mediterranean Sea and in the neighborhood of the Caspian Sea. Tradition says that in the year 1000, Leif Ericson landed on the coast of what is now New England, and called the country "Vinland" because of the wild grapes growing there.

At the present time there are nearly 800 varieties of grapes grown in America. These have been developed either by the careful selection and cultivation of native stocks, or by the grafting of European varieties on the roots of American vines. In the Eastern United States, practically all of the varieties are of the former kind, while in the Western states the European vines have

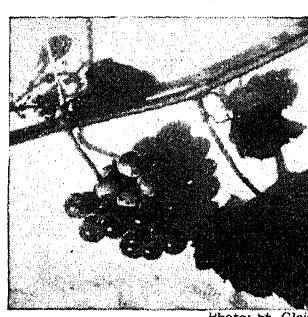


Photo: St. Clair

#### WILD GRAPES

A cluster which shows the great decorative beauty of the plant.

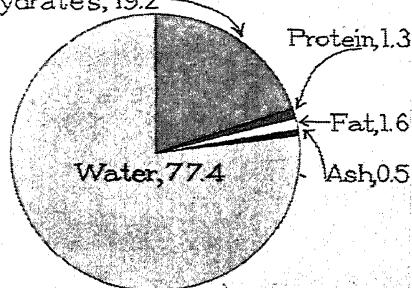
proved successful. The failure of the latter in the Eastern states was due to a pest called *phylloxera*, which attacks the imported more violently than the native varieties.

When the phylloxera was accidentally introduced into France in 1860, the entire grape-growing industry of that country was threatened with extinction. Many remedies were tried, but the solution finally was found in using the roots of native American vines on which to graft the excellent varieties of the Old World. This measure proved successful because American vines have developed an immunity to this pest through many years of exposure.

**Kinds of Grapes.** There are three main types of grapes grown for market—the *vinifera*, *labrusca*, and *muscadine*. Numerous varieties in each group have been developed. In North America, *vinifera* grapes are raised largely in California. They are derived from vines that were originally developed along the Mediterranean. To this group belong the Malaga, Muscat, Thompson Seedless, Sultana, and others, the last three of those named being used extensively for raisin production (see RAISINS). In seed varieties of *vinifera* grapes (used for wine manufacture), the seeds are easily separated from the pulp. These grapes all possess a closely adhering skin. To the *labrusca* group belong, among other varieties, the sweet, reddish Catawba, and the famous

purple Concords and well-flavored Delawares. The labruscas are native American grapes, grown in the sections east of the Rocky Mountains and north of the South Atlantic and Gulf states. They are also produced in Southern Canada. Labrusca grapes have seeds that cling tightly to the pulp, but they possess

### Carbohydrates, 19.2

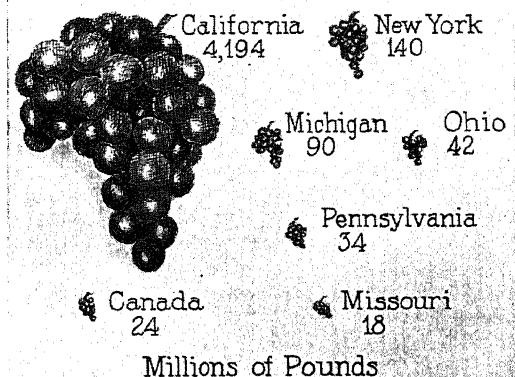


### COMPOSITION OF GRAPES

Figures indicate percentages. The heat-producing value of grapes is 435 calories per pound, therefore about equal to very lean round steak, brook trout, green corn, and boiled potatoes. Their fuel value is thus seen to be not high.

easily separated skins. Muscadines are native American grapes grown in the South Atlantic and Gulf states. They are large, round, tough-skinned fruits that fall from the vines as they ripen, like berries. Typical varieties include Eden, Flowers, Scuppernong, and La Salle.

**Methods of Culture.** The grape is a climbing plant, and clings to every available support by means of tendrils. The wild grape is propagated by seeds, but in modern vineyard



### GRAPES GROWN IN A YEAR

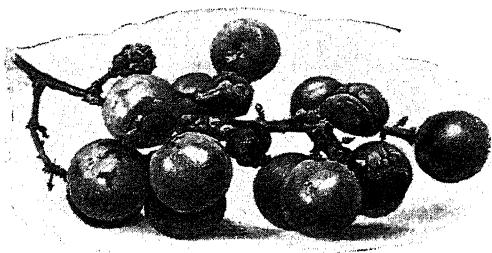
The average crop in seven leading centers of production. Figures present averages for four years.

practice, well-developed cuttings called *canes*, with three buds, are planted. Sometimes these are rooted directly in the open, but more often they make their first growth in a nursery. In the vineyard, where the soil is well tilled for the planting, the vines are set in rows that

vary from seven to ten feet apart. The warmer the climate, the wider the spacing between rows and between plants in the row. Labrusca grapes are trained upon wire trellises in commercial practice, and muscadine on poles or on wires stretched across the tops of posts. Only the vinifera vines are self-supporting.

Care must be taken to prevent the young vine from overburdening itself, for one that bears too heavily at first may become permanently weakened. The first season after transplanting, the vine should not bear any fruit at all; from three to six clusters, according to its size and vigor, is sufficient for the second season; the third year it should produce about ten pounds of grapes; and the fourth, double that number. Twenty pounds per vine is considered an average crop, but it is recorded of a famous Concord vine that it bore each year at least ten bushels. Such a yield is, of course, exceptional.

One of the secrets of successful grape culture is to make sure that the grapes are grown on shoots of that season's growth. At the beginning of every winter, all branches and shoots



BLACK ROT

A cluster of Niagara grapes of which half have black rot. Some of those affected have dried down to mummies.

must be cut back to from two to five buds. A vineyard in winter appears like a barren waste of land—having nothing but stubs and twigs, but within a few months the trellises are covered with vines and fruit.

**Enemies of Grapes.** Besides the phylloxera, previously mentioned, the grape is injured by the rootworm, grape leaf hopper, and grape berry moth, all of which are controlled by insect sprays (see INSECTICIDES AND FUNGICIDES).

Of diseases that attack grapes, the most serious are powdery mildew and black rot. The former especially attacks the green shoots and fruits of vinifera varieties. Dusting powdered sulphur on the vines is the standard method of control. Labrusca grapes are especially susceptible to black rot, which blackens and withers the fruit. Bordeaux mixture is used to check the disease.

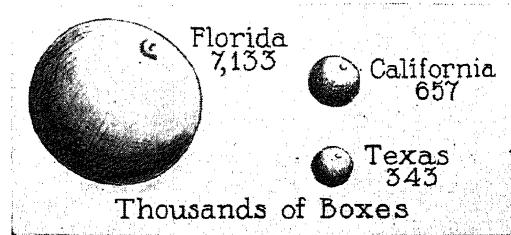
**Uses of the Grape.** The first use of grapes was naturally as a fresh fruit, the flavor and

nourishing qualities, due to the large quantity of sugar contained, rendering them superior to other fruits known in olden days. Then came the juice of the grape, drunk directly as squeezed from the fruit, or after it had been fermented and turned into wine. Dried grapes, or raisins, early became a staple article of food, and among the Greeks the seedless grapes of Corinth, the original currants, formed practically the only food of the athletes. In modern households, raisins and dried currants appear daily in cakes, puddings, pies, jams, and jellies; and grape juice, a refreshing, nourishing drink made of the unfermented juice of the fruit, is highly esteemed throughout the world.

**Grapevines as Decorations.** The grapevine, properly trained, affords perfect shade, and is able to transform the most bare and unsightly buildings into things of beauty. In all towns and villages there are houses on which the sun shines from the east, west, and south, blistering the paint and in summer rendering them almost uninhabitable. Grapevines would turn the sunshine into fruit and foliage, save money, and materially add to the health of the home. Arbors and pergolas draped with vines add to the beauty of parks and gardens, and, with little care and outlay, the grape will turn dreary places into spots of beauty. B.M.D.

**Scientific Names.** The grape family is *Vitaceae*. The European grape is *Vitis Vinifera*; the northern American varieties are derived from *V. labrusca*; the southern (muscadine) from *V. rotundifolia*.

**GRAPEFRUIT**, a citrus fruit that has an acid and somewhat bitter flavor, but which, when eaten with sugar, is one of the most delightful of breakfast fruits. As a food to quicken the appetite, at the beginning of the day, the grapefruit has hardly a rival. It is also in high favor as an ingredient in fruit salads.



PRODUCTION CHART

Average yield each year, based on production for four consecutive years, as reported by the United States Census Bureau.

This large, handsome, yellow fruit, whose habit of growing in clusters like grapes is responsible for its name, has not always been so appreciated as it is to-day. The Spaniards introduced the tree into Florida early in the sixteenth century, and because it is very showy, with its dark, shining foliage and large, fragrant

flowers, the Floridans long cultivated it as an ornamental. The fruits, however, were left on the ground to rot, until, in the last quarter of the nineteenth century, a demand for grapefruit was created in the North by winter visitors who had acquired a taste for it while



HOW GRAPEFRUIT GROWS

in Florida. From 1900 on, the grapefruit grew in popularity, and now it is one of the leading fruits of Florida, and also a commercial crop of California. For comparative crops, see the production chart, column one.

The grapefruit tree is especially adapted to the soil and climate of Central and Southern Florida. It is not hardy, and thrives best in a frost-free region where the soil is well drained and rather sandy. It is usually propagated by budding, either on grapefruit stock or on rootstocks of the sour orange. By cross-breeding and grafting, the acidity of the fruit has been greatly modified. The plants are subject to a disease called citrus canker, which spots the fruit and leaves. Destruction of infected trees is the method most commonly used to fight this disease.

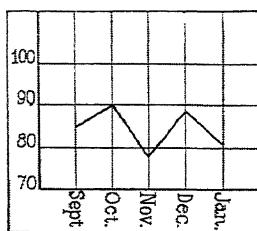
B.M.D.

**Classification.** The grapefruit is classed as *Citrus decumana*, family *Rutaceae*. The correct horticultural name of the fruit is *pomelo*. There is a pear-shaped variety called *shaddock*, which is so acid as to be inedible. Botanically it is of the same species as the pomelo, but is regarded as a distinct fruit by horticulturists.

**GRAPE SUGAR.** See GLUCOSE; DEXTROSE.

**GRAPH,** *graf*, a diagram showing the relation of numerical quantities. It is used for the purpose of presenting facts in a pictorial way, thus making them clearer and easier to understand. Suppose we have a record of a student's grades in arithmetic. In September he made a grade of 85; in October, 90; in November, 78; in December, 88; and in January, 81. His progress may be illustrated as in the accompanying diagram. This is called a *line graph*, and it is one of the simplest types. It is made by drawing two lines at right angles to each other, and using one line for the grades and the other for the dates. Points are then located in the diagram to indicate the grades on the successive dates. These points are then connected by a line which shows the relation between the two sets of data and indicates the progress of the pupil. This type of graph may be used to show many kinds of facts, such as the number of pupils present in a class on certain days, the amount of production of factories or farms at given times, or statistics of income, taxes, wealth, athletics, trade, and population.

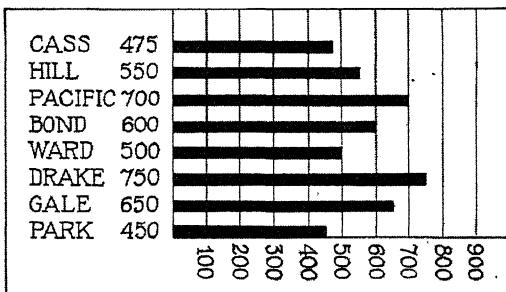
Another kind is the *bar graph*, which may be used to illustrate the same kinds of facts. For example, the enrollment in the schools of a district on a certain date may be shown as in the accompanying diagram. This type of



LINE GRAPH

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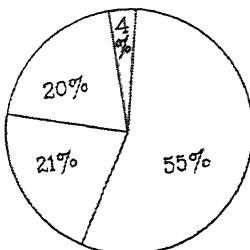
BAR GRAPH

graph is very effective in showing comparison of the data which it illustrates. It may also be used to show the increase and decrease of various quantities.

A good way to show the relation of the parts of anything to the whole, is by means of the *circle graph*. The cost of public education in the United States in 1925-1926 was \$2,016,812,685, divided as follows: General control, 4 per cent; instruction, 55 per cent; current

expense, 21 per cent; new buildings, 20 per cent. The illustration shows the relative sizes of these expenditures.

There are many other kinds of graphs for visualizing innumerable subjects, but for general purposes, it is sufficient to say that the elementary use of graphs is for the purpose of illustration rather than for exact calculation.



E.U.G.

[Throughout THE WORLD Book will be found hundreds of graphs of varying character.]

**GRAPHITE,** *graf' i te* (also called PLUMBAGO). Like the diamond, pure graphite is composed exclusively of carbon. Here we find one of the wonders of nature: the brilliant, sparkling diamond, the hardest known substance, and the black, crumbling, greasy graphite, the softest known mineral, are merely different forms of the chemical element, carbon.

This mineral is used for the "lead" in lead pencils. It is of an iron-black or dark-gray

FIGURES REPRESENT THOUSANDS OF TONS

|                   |                     |        |                  |         |
|-------------------|---------------------|--------|------------------|---------|
| Chosen<br>(Korea) | Czecho-<br>slovakia | Ceylon | Germany          | Austria |
| 18                | 13                  | 12     | 12               | 11      |
| Mada-<br>gascar   | Italy               | Mexico | United<br>States | Canada  |
| 11                | 9                   | 4 1/2  | 4 1/2            | 2       |

PRODUCTION CHART

Comparing lead pencils of different sizes we indicate clearly the annual production of graphite from the principal countries.

color, with a metallic luster, and is found in masses which are composed of minute scales crowded together. It is very soft and brittle and is easily reduced to a fine powder. It has a soapy touch, but will leave its mark on almost any substance it touches; this characteristic makes it valuable for pencils.

Graphite is found in pockets in the older crystalline rocks. Some graphite was formed from plants in the same manner as coal, though the process was carried further. It is mined and prepared for the market by being ground and then purified in settling tanks. Its chief uses are in the manufacture of lead pencils, for lubricating machinery, and for making crucibles. For the last purpose it is mixed with clay, which acts as a binder and forms a crucible that will not melt under the most intense heat.

Graphite is obtained from two sources. It occurs in natural deposits and it is manufactured from carbon. The largest producers of natural graphite are Chosen and Czechoslovakia; the quantities mined in Ceylon, Germany, Austria, Italy, India, the United States, and Mexico are also commercially important. The accompanying graphic chart shows the relative amounts produced in these countries.

The mining of graphite in the United States is distributed over a wide area. In the eastern section, New York, Rhode Island, and Pennsylvania are valuable sources of supply. In the South, Alabama has large deposits, having nine centers of production. Among the Central states, Michigan is the leader, while in the Southwest, Texas is becoming a prominent producer. In the western section, Colorado, Montana, Nevada, and California each have at least one graphite mine.

The manufacture of graphite centers in the Acheson plant at Niagara Falls, N. Y. Here electric furnaces are employed to transform coke or anthracite into graphite by means of powerful electric currents. The output amounts to more than 1,300 short tons annually, but even this addition to the supply from mines does not furnish enough for domestic use. Annual imports exceed the total production from all sources. Manufactured graphite is of excellent quality, and fully equal to the natural product. See PENCIL; CARBON; ALLOTROPY. A.N.W.

**GRAPHOPHONE, graf' o fone.** See PHONO-GRAPH.

**GRASMERE.** See WORDSWORTH, WILLIAM.

**GRASSES**, a family of plants remarkable for its wide distribution and variety of forms, outranking all other families of the vegetable kingdom in point of usefulness to man. In the tropics the grass family is represented by the giant bamboos, that tower one hundred feet or more toward the sky; far to the North, mosslike grasses a few inches high struggle for an existence in the hard bosom of the frozen earth; in the temperate regions, the larger grasses clothe with a beautiful garment of green the meadows, lawns, and hillsides. Says a botanical writer:

Grasses there are, stout and higher than one's head, and grasses so slender that their dying stems among wayside weeds are like threads of gold; grasses whose panicles of bloom are more than half a yard in length, and of a color which only a midsummer sun can burn into August fields; grasses so stiff that winter's snow leaves them unbroken, and grasses so tiny that their highest flower is raised but a few inches from the soil.

The great grass family contains about 4,700 species, nearly 1,000 of which are found in the United States and Canada. It includes the great cereals of the world—wheat, corn, oats, rye, barley, and rice, which provide man with

the most important part of his vegetable food. The majority of grasses are herbs, but the treelike species, such as the bamboos, have woody stems. From the standpoint of utility, the bamboo (which see) is one of the most remarkable of the plants which man has found adapted to his needs, and there are many other grasses of great economic value. Esparto, a tough, coarse grass imported from Spain and North Africa, is used to a considerable extent in paper-making and for stuffing mattresses. Sugar cane, also a member of the grass family, furnishes the world with about one-third of its supply of sugar.

Then there are the meadow and pasture grasses, valuable as a source of food for farm animals. Among the principal pasture grasses are red-top, blue grass, bent grass, blue stem, and Bermuda grass; the hay grasses include red-top, blue grass, timothy, orchard grass, Johnson grass, meadow foxtail, tall oat grass, and rye grass.

Grasses are flowering plants which produce flowers that are extremely complex in structure, and characterized by an arrangement in panicles or spikes, yielding a delightful variety and quality of form. All grasses have fibrous roots and nearly all have hollow, jointed stems. According to arrangement on the stem, the leaves are said to be two-ranked; that is, each alternate leaf grows on the opposite side of the stem from the one before it, which brings the third one directly above the first, and the fourth above the second. The various species grow in every variety of situation—in dry, barren places, in moist, rich soil, in marshes, in stagnant water, on inland prairies, and along the seacoast. The botanical name of the family is *Gramineae*. See next page. B.M.D.

**Related Subjects.** The reader who wishes to gain an appreciation of the economic importance of the various members of the grass family is referred to the articles listed below. Other grasses, not of economic value, are indexed at the end of the article WEEDS.

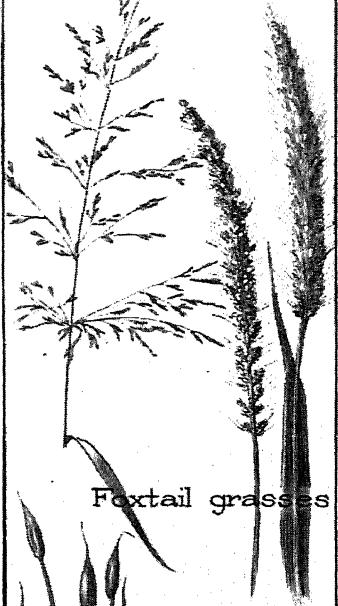
|               |             |
|---------------|-------------|
| Bamboo        | Maize       |
| Barley        | Millet      |
| Blue Grass    | Oats        |
| Broom Corn    | Rice        |
| Cane          | Rye         |
| Corn          | Sorghum     |
| Couch Grass   | Sudan Grass |
| Creeping Bent | Sugar Cane  |
| Esparto       | Sweet Flag  |
| Foxtail Grass | Timothy     |
| Gama Grass    | Wheat       |
| Hay           | Wild Barley |
| Kafir Corn    |             |

**GRASSHOPPER.** This is a popular name for two families of straight-winged, leaping insects, which hop through fields and meadows or along dusty roadsides the summer long. One species is described by Leigh Hunt, in *To the Grasshopper and the Cricket*, as—

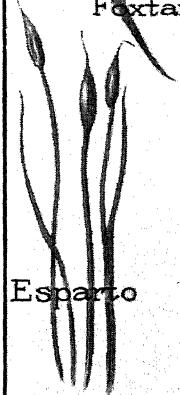
Green little vaulter in the sunny grass,  
Catching your heart up at the feel of June,

# SOME of the WILD GRASSES

Red-top



Foxtail grasses



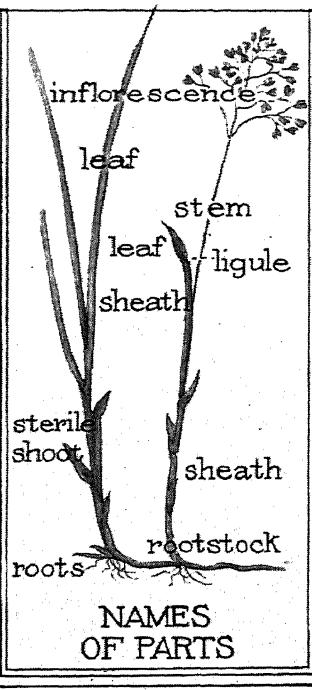
Esparto



Orchard grass



Salt-marsh cockspur grass



Bermuda grass



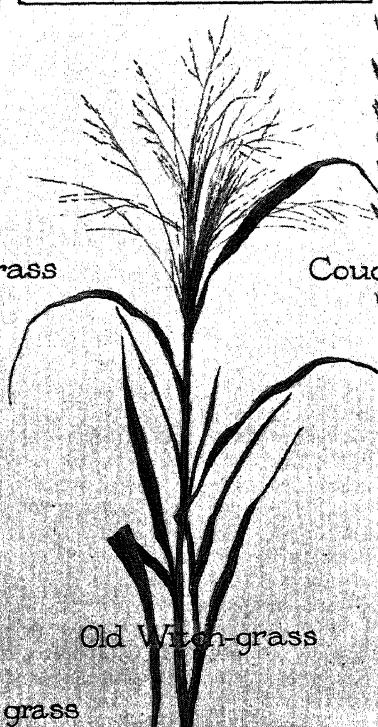
Reed canary-grass



Wine-grass



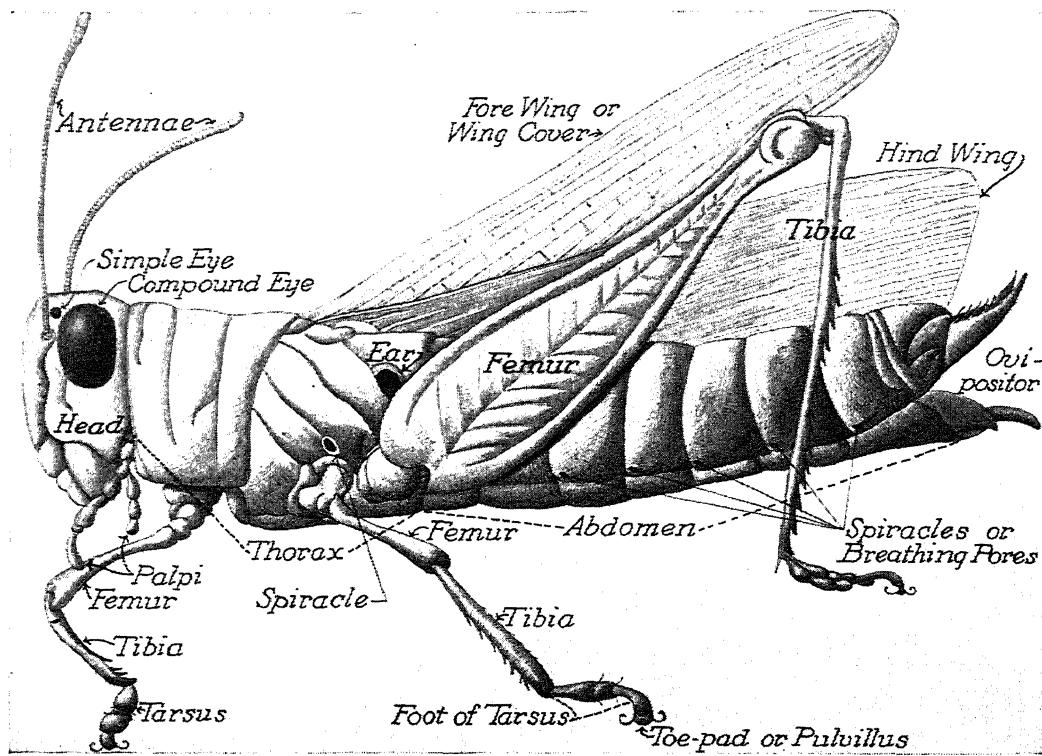
Couch-grass



Old Witch-grass



Wavy hair-grass



PARTS OF THE GRASSHOPPER

Sole voice that's heard amidst the lazy noon,  
When even the bees lag at the summoning brass.

All are characterized by long, slender hind legs with large thighs, adapted for jumping; by mouth parts fitted for biting; and by large, delicate hind wings with strong powers of flight, protected, when at rest, by thickened, tough fore wings which extend far beyond the end of the abdomen. Included among the grasshoppers are the insects commonly called locusts, but though all locusts are grasshoppers, not all grasshoppers are locusts. The chief distinguishing character is the length of the antennae, or feelers.

*Long-Horned Grasshoppers.* The green meadow grasshoppers that country boys and girls delight to catch by hand are the long-horned species. Their threadlike, curving antennae are, in fact, much longer than the bodies of the insects themselves. Meadow grasshoppers belong to the same family as the katydids, but they are truly "hoppers in the grass," while katydids live in trees. When irritated, the grasshoppers "spit" out a brown liquid that children call "tobacco." They take long leaps in the grass when trying to escape, trusting to the green color of the vegetation to conceal them. If the boy chasing one of these agile hoppers could jump as high, in proportion

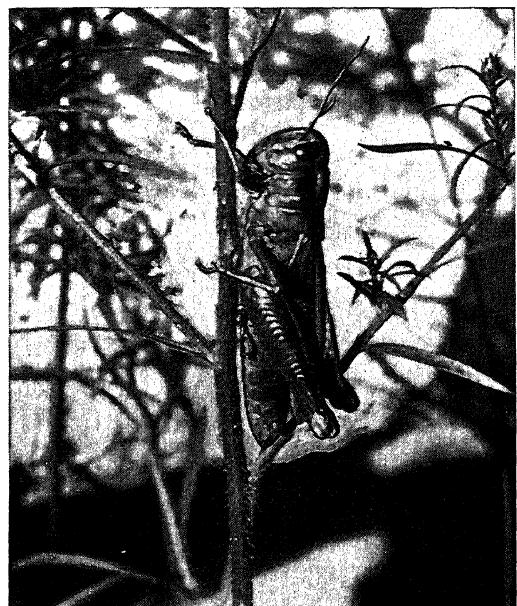
to his size, he could easily clear his father's barn in one leap.

The male grasshoppers "sing" by rubbing their front wings against the body, and the females listen with their legs, for the auditory organs are on these appendages below the first joint. At the end of the female's abdomen is a long process called an *ovipositor*; this is used to drill a hole in which to lay her eggs. These eggs are often deposited in slits in grass stalks just above the ground. The young look something like ants when hatched, but develop wings in about two weeks. Meadow grasshoppers eat pieces out of tender leaves and stems, but are not so injurious to crops.

*Short-Horned Grasshoppers.* The short-horned grasshoppers are the insects known usually as locusts. The short ovipositor, as well as short antennae, helps to distinguish the locusts from the meadow grasshoppers. In the article *Locust*, in these volumes, the reader will find interesting details about the migrations of the locusts, and their terrible devastation of standing crops. The incredible numbers of these grasshoppers are often referred to in the Bible: "like grasshoppers for multitude," *Judges vi, 5 and vii, 12*; "more than the grasshoppers, innumerable," *Jeremiah XLVI, 23*.

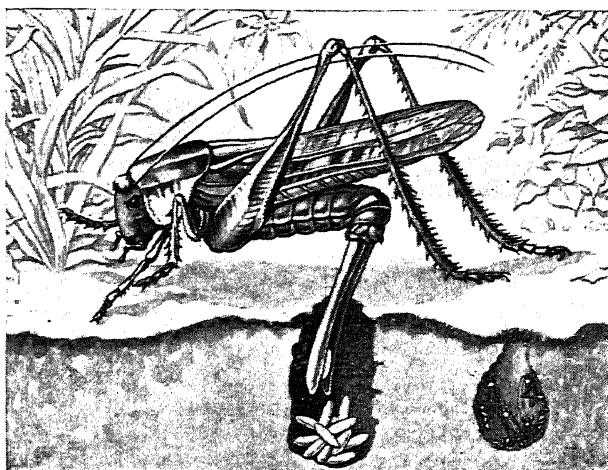
The males make their loud calls to the females by friction of the hind legs against portions of the wings; when in flight, some species make a loud clacking sound by striking together the upper surface of the front edge of the hind wings and the under surface of the front wings. The auditory organs are on the first abdominal segment.

Like meadow grasshoppers, locusts have an incomplete metamorphosis, the young resembling the adults in general form, but lacking wings. The eggs are laid just below the surface of the ground, usually in the fall. From 25 to 125 eggs are deposited in a podlike mass by each female, and are covered with a sticky film that holds them together. Some species may deposit several masses during a lifetime. The nymphs hatch in the spring, and within eighty or ninety days, after molting



A FAMILIAR POSE

four or five times, develop into full-grown insects. In another week the mature insects mate, the eggs are laid for another generation, and within four weeks more the parents die.



FEMALE ENGAGED IN EGG-LAYING

**Grasshoppers as Food.** The locust has long been an important article of food in various parts of the world. In the Mosaic law, the locust and the grasshopper were exempted

from the decree forbidding the eating of flying and creeping creature going "on all fours."

Shakespeare, in *Othello*, speaks of food "luscious as locusts," and Saint Matthew says of John the Baptist that "his meat was locusts and wild honey." The insects are candied in China, and are an important article of the Filipino diet. In the desert parts of Arabia and in

the North African plains near the Red Sea, the bodies are dried, ground into a powder, and mixed with flour for bread.

The Indians in the Great Plains region of North America found roasted grasshoppers a great delicacy. It is believed by some archaeologists that the grasshopper plagues may account for the migrations of ancient American civilization.

W.J.S.

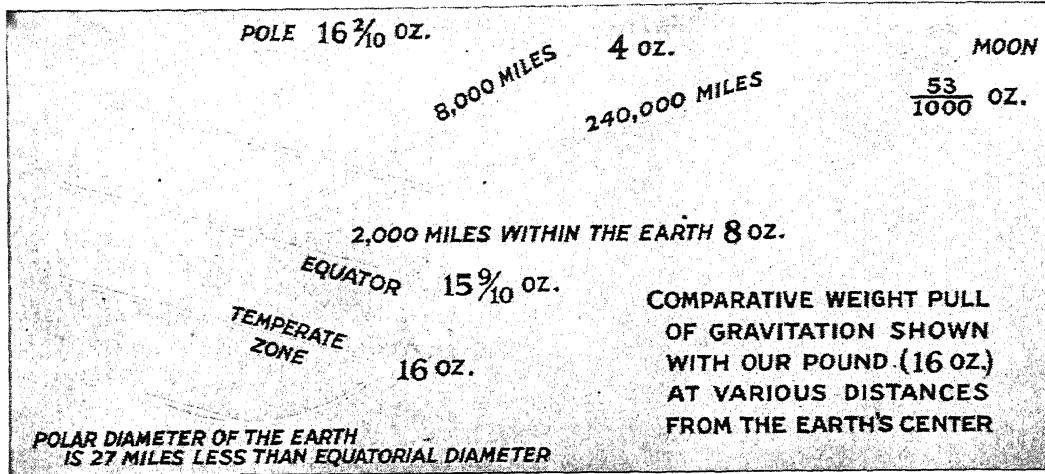
**Classification.** The long-horned grasshoppers belong to the family *Locustidae*, though no locusts are therein included; the short-horned are in the family *Acriidae*. The common meadow grasshopper is classed as *Orchelimum vulgare*. The most conspicuous American locust is the Rocky Mountain species, *Melanoplus spretus*. All of the species belong to the order *Orthoptera* (which see).

**GRASSING.** See BLEACHING.

**GRASS LAKE.** See ILLINOIS (Physical Features).

**GRASS SNAKE.** See GARTER SNAKE.

**GRASS-WIDOW**, a term once applied to a married woman temporarily parted from her husband, and now also to a divorced woman. The term probably originated during the nineteenth century, when European husbands in India during the summer sent their wives to the hills. Here grass was plentiful, which was not the case in the sweltering plains, a circumstance of economic importance, and therefore applied to those wives who spent the summer in the grass country. In the California gold fields, a miner often left his wife to board in some family while he was prospecting at a distance, and he called this "putting his wife to grass." Some think this is the origin of



DIFFERENCES IN WEIGHT AT VARYING DISTANCES FROM THE EARTH'S CENTER

the term grass-widow, but the former explanation is more plausible.

**GRATING.** For diffraction grating, see DIFFRACTION.

**GRATTAN**, HENRY (1746-1820), an Irish politician and orator who, for his services to his country, was voted \$250,000 and "a house and lands for him and his heirs forever," by the Irish Parliament. He was born in Dublin, educated at Trinity College, and admitted to the Irish bar. In 1775 he was elected as representative to the Irish Parliament, into which he infused such a spirit that mainly to him was due the partial abolishment of the heavy restrictions on Irish commerce. For his services in obtaining this great concession, he was voted the gift above named. He became the head of the Irish Whig party and temporarily withdrew from Parliament, but returned in 1805. His later years were spent in working for Roman Catholic emancipation. He did not have a strong voice, yet he ranked high as an orator. His invective against Bonaparte and his eulogy on Chatham are not surpassed in British eloquence. He died in London, and is buried in Westminster Abbey.

**GRATZ**, *grahts*, capital of Styria, a province of Austria. See AUSTRIA (The Cities).

**GRAVENHAGE**, *grah' vən hahg*, the name of the capital of The Netherlands since 1929, supplanting the old name, The Hague.

**GRAVEYARD OF THE ATLANTIC.** See SABLE ISLAND.

**GRAVITATION**, *grav i tā' shun*. It has always been the aim of the scientist to find a logical explanation for everything that takes place in nature. Why does a heavy object held in the hand seem to pull the hand toward the floor? Why does the object fall if the hand releases it? Actions of this sort were long ago referred to a force called *gravitation*, which

was regarded as a mutual attraction between masses of matter. Sir Isaac Newton is honored as the discoverer of this force, because in 1687 he announced a universal law of gravitation, and gave it specific mathematical form. This law was based on the researches of Galileo and other scientists, particularly on the laws of planetary motion worked out by Johann Kepler (see his biography for a statement of these laws). Newton's law is as follows:

Every particle of matter in the universe attracts every other particle of matter. The direction of this attraction is the line joining two portions of matter. Its force varies directly as the product of their masses, and inversely as the square of the distance between their centers of mass.

According to this law, no matter how large or how small any given bodies are, the force of gravitation is acting between them. A stone falls to the ground because the earth attracts it; but the stone in turn attracts the earth. Each moves to meet the other, but the stone passes through a much greater distance than does the earth, simply because it is so much smaller. As a matter of fact, the mass of the earth is so great that its motion is imperceptible with relation to any small object; but, put it within close range of a mass as large as the sun, and it would be drawn to the surface of that object just as a stone is drawn to the earth's surface.

In the field of astronomy, the application of Newton's law has added immensely to our knowledge of the universe. One of the most striking results of its application was the discovery of the planet Neptune, the existence and position of which were calculated from variations in the motions of Uranus. Astronomers correctly interpreted these variations as due to the attractive force of an unknown planet (see NEPTUNE).

**Newton and Einstein.** In 1915 Einstein announced his general theory of relativity, and four years later it was stated that proof of its validity had been obtained. This announcement gave rise to the report that Newton's theory of gravitation had been overthrown. What really happened was this: Einstein gives a different description of gravitation, and in 1919 (and in 1922) one particular postulate of his was verified. The Einstein conception of gravitation is about as follows:

Different objects do not attract each other by exerting a pull. Space (in the Einstein theory this is called *space-time*) has an inherent warp, or curvature, in the neighborhood of matter, and this curvature is greatest near heavy bodies. Gravitation is the natural effect of the curvature of space-time, and the region around a massive body within which the special curvature is manifested is the gravitational field of that body. The gravitational field of the sun may be thought of as a hill in space-time, which grows steeper toward the top. At the very top of the hill is the sun. Bodies like the planets, moving in this gravitational field, are deflected around the precipitous top instead of moving across it, because the curved path is the easiest one to take. Thus, in the Einstein theory, gravitational fields are substituted for action at a distance. In the case of falling bodies, the appearance of falling is due to the special direction which is forced upon motion near great masses of matter by the curvature of space-time. (One difficulty in explaining this theory is that it forces us to create mental pictures outside the scope of our sense impressions. It is best explained by mathematical formulas.)

The reader will at once ask why, if Newton's theory is wrong, its applications have brought such magnificent results. The answer is that Newton's mathematical calculations do hold true for bodies moving with relative slowness, regardless of the truth of his theory of attraction. Einstein admitted that most of his calculations for the movements of the planets would vary so slightly from Newton's that no appreciable difference could be noticed. In the case of very rapid motion, however, he asserted that there would be a difference. The test he offered was the displacement of light rays from a star to earth, when the rays passed through the gravitational field of the sun. Light has a velocity of over 186,000 miles per second, and there is no faster motion known. Einstein predicted that the displacement would be twice that calculated by the Newton formula. In 1919 and 1922, during solar eclipses, his prediction was verified (see EINSTEIN'S THEORY OF RELATIVITY for still another proof). Those scientists who accept the theory believe that Einstein has proved his case, but there are

notable authorities who disagree with his hypothesis and are not convinced of its validity.

The reader should understand, however, that stating a law according to which something acts is not explaining what that something really is. No one knows the cause of gravitation. Newton did not try to answer the question, nor has Einstein answered it. To explain something, we tell what it is in terms of something that is more simple and more common. Certainly "space-time" and "warped space" are neither simple nor common.

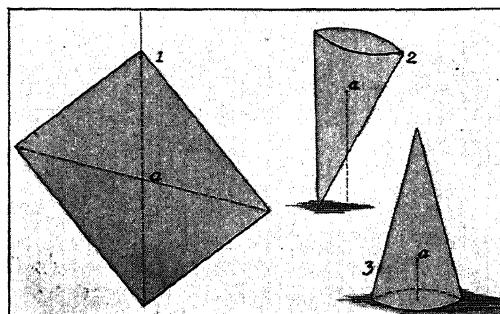
A.L.F.

[In 1929 Einstein announced an extension of his theory, in which he suggested that gravitation and electromagnetism are aspects of the same universal law. See EINSTEIN'S THEORY.]

**Related Subjects.** In addition to references given above, the reader is referred in these volumes to the following articles:

|                |                    |                   |
|----------------|--------------------|-------------------|
| Attraction     | Gravity, Center of | Newton, Sir Isaac |
| Falling Bodies | Light              | Weight            |

**GRAVITY, CENTER OF.** Many textbooks now use the term center of mass, instead of center of gravity. If you stick a pin through a point near the edge of a blotter and allow the latter to swing freely, it will come to rest at a position in which most of the blotter is below the point of suspension; if you move it, it will return always to this same position. There is one point in the blotter, however,



CENTER OF GRAVITY

called the center of gravity, or center of weight; if you stick the pin through this, the blotter will remain in whatever position you place it. How to find this center of gravity is shown at (r) in the illustration.

When the force of gravity acts on an object, its power seems to be applied at the center of gravity. When a cone is in the position shown at (2), so that a line directly downward from the center falls outside of the object, the pull of gravity will upset the cone by drawing the center toward the earth. But in the position at (3), where a similar line falls within the base of the cone, gravity merely holds the article still, because to tip it in either direction, the center must be raised. In the first case, it is

said to be in *unstable equilibrium*; in the second, in *stable equilibrium*. Everyone knows that a board standing on end will fall, that one on its edge may be balanced but is easily overturned, but that a board resting on its broad side will stay in that position. From this fact, it may be seen that the higher the center of gravity of an object, the more likely the object is to tip.

A center of gravity may be outside of its object, as in the case of anything hollow, like a boat or a dish. The point at which the attraction of the sun influences the earth is not the center of the earth, but the center of gravity of the earth and the moon combined, for, although they do not form a single object, their mutual attraction makes it impossible for the sun to pull on one without pulling on the other; they are like a dumb-bell with one large and one small end. The center of gravity of a body is *not* the point where there is as much matter on one side as on the other side. The center of gravity is the center of gravitational moments.

A.L.F.

**Related Subjects.** The reader is referred in these volumes to the following articles:

Einstein's Theory  
Falling Bodies

Gravitation  
Physics

**GRAVITY, SPECIFIC.** There was consternation at the court of Syracuse one day, many hundreds of years ago, when Hiero, the king, on receiving a new crown, decided that it was not made of solid gold, as he had ordered, but was alloyed with silver. He was furious! A king's crown must be of purest gold. Besides, he did not intend to be cheated. But his problem was simple; he merely sent the crown to Archimedes, with the command that he settle the matter.

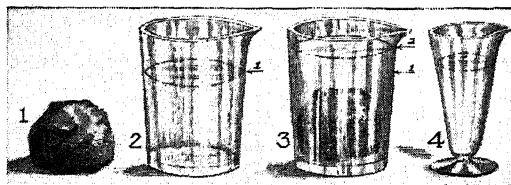
Archimedes was one of the wisest men in Greece about 200 B.C. In the article under his name, you will find an account of his life and the marvelous things he did. But Archimedes, for all his wisdom, was much puzzled by the problem presented to him. For a long time he was unable to devise a way of finding out whether the king's crown was actually made of pure gold, without destroying it. Then, one day, when he was getting into the bath, he noticed the spilling over of the water and it gave him his inspiration. He would take the crown and put it into a vessel filled with water and note how much spilled over. Then he would take the same weight of pure gold and put it into a vessel containing exactly the same amount of water. If the crown were also of pure gold, it would be exactly equal in bulk to the piece of gold, and the amount of water displaced would be exactly the same in both cases. But if the gold in the crown were mixed with silver, it would be greater in bulk than the piece of pure gold, and the amount of water spilled over would show it. In short, Archi-

medes had discovered how to determine the *specific gravity* of a substance.

Specific gravity is the weight of a given quantity of a substance as compared with that of an equal volume of another substance used as a standard. Stated more simply, it is the ratio of its density to the density of a standard substance. Water is usually taken as the standard of comparison for solids and liquids, while air is taken as the standard for gases. The specific gravity of a solid or liquid is the ratio between its weight in air and the weight of an equal volume of water; this ratio is secured by dividing its weight in air by the weight of an equal volume of water.

*Archimedes' principle*, that a body immersed in a fluid displaces an amount of the fluid equal to its own loss of weight, furnishes the most convenient method of finding the specific gravity of a substance. To find the specific gravity of a body heavier than water, first weigh the substance in air; then weigh it in water; then subtract the weight in water from the weight in air. The result will be the weight of the volume of water displaced. Divide the weight of the substance in air by its loss of weight in water, and you will have the specific gravity of that substance.

To find the specific gravity of a body lighter than water, weigh the body in air. Then take a sinker heavy enough to keep the body under



AN EXPERIMENT IN FINDING SPECIFIC GRAVITY

Fig. 1 is a stone. If the stone is immersed in water, as shown in Fig. 2, it will raise the water in the tumbler as much as the space it occupies; that is, speaking scientifically, it will displace its own bulk of water. Fig. 3 indicates the increase in the height of water. Fig. 4 represents the water which equals the bulk of the stone. When that quantity of water and the stone are weighed it can be determined how many times heavier than water is the stone. The resulting quotient is the *specific gravity* of the stone.

water, and weigh the sinker in the air and in the water. Then weigh both the body and the sinker in water. By subtracting the loss of weight of the sinker in water from the loss of weight of the two bodies together, the loss of weight of the light body is obtained. Divide the weight of the light body by its loss of weight in water, and the result is its specific gravity, which will, of course, be less than 1.

In finding the specific gravity of a liquid, a specific-gravity bottle is commonly used. This bottle is made to hold a certain weight of water, say a thousand grams. Fill the bottle with the

liquid to be tested and weigh it. Divide the weight of the liquid in the bottle by the weight of water it is made to contain (1,000 grams), and the result is the specific gravity of the liquid. The specific gravity of a liquid may also be found by the use of a hydrometer (which see). See, also, DENSITY; HYDROSTATICS.

A.L.F.

**Problems.** (1) To find the specific gravity of a body heavier than water:

A piece of metal weighs 17 pounds in air and 15 pounds when immersed in water. What is its specific gravity?

**Solution.** 17 pounds - 15 pounds = 2 pounds, the weight of an equal volume of water.

$$\text{Since } S.G. = \frac{\text{weight of body}}{\text{weight of equal bulk of water}}$$

$$S.G. = \frac{17}{2} = 8.5.$$

(2) To find the specific gravity of a body lighter than water:

A block of wood weighs 12 ounces in air, and a sinker weighs 30 ounces. What is the specific gravity of the wood, if the sinker weighs 25 ounces in water and the two together weigh 7 ounces in water?

**Solution.** 30 ounces + 12 ounces = 42 ounces, combined weight of the two objects in air.

42 ounces - 7 ounces = 35 ounces, loss of weight of the two objects in water.

30 ounces - 25 ounces = 5 ounces, loss of weight of the sinker in water.

35 ounces - 5 ounces = 30 ounces, loss of weight of the wood in water.

$\frac{12}{30} = 0.4$ , specific gravity of the wood. In this case

$$S.G. = \frac{\text{weight of body}}{\text{lifting effect of water on body only}}.$$

(3) To find the specific gravity of a liquid without using a specific gravity bottle:

A bottle weighs 300 grams when empty, 800 grams when full of water, and 675 grams when full of gasoline. What is the specific gravity of the gasoline?

**Solution.** 800 grams - 300 grams = 500 grams, weight of the water.

675 grams - 300 grams = 375 grams, weight of the gasoline.

$$S.G. = \frac{\text{weight of liquid}}{\text{weight of equal volume of water}} = \frac{375}{500} = 0.75.$$

**GRAVITY CELL.** See ELECTRIC BATTERY.

**GRAVITY SYSTEM.** See HYDRAULICS.

**GRAY, ASA** (1810-1888), recognized as the foremost American botanist of his day, was born at Paris, N. Y. After a few years spent in the practice of medicine, he became curator of the New York Lyceum of Natural History. In 1838 he was appointed professor of natural history in the University of Michigan, and in 1842 accepted a like appointment at Harvard College. As the leading disciple of Darwin in the United States, he advocated and defended the theory of evolution as being in harmony with the strictest religious views. See DARWIN, CHARLES.

**His Writings.** The collection of Gray's brilliant discussions on evolution is entitled *Darwinia*. His

writings include many valuable textbooks on American flora, some of which are *Field, Forest, and Garden Botany*; *How Plants Behave*; *New Flora of North America*.

**GRAY, ELISHA** (1835-1901), an American inventor for whom his friends claimed the honor of originating the telephone, denying the credit to Alexander Graham Bell. He was born at Barnesville, O., and attended Oberlin College, maintaining himself there by working as a carpenter. Beginning his investigations in 1867, he took out nearly fifty patents for telegraph, telephone, and other electrical appliances, including a type-printing and a writing or copying telegraph. In 1876 he filed in the Patent Office specifications for a telephone, but the patent was finally awarded to Alexander Graham

Bell (which see). Gray was for a number of years engaged in the manufacture of telegraph apparatus in Chicago and Cleveland. He was the author of *Harmonic Telegraphy and Telephony* and *Nature's Miracles*. See TELEPHONE.

**GRAY, GEORGE** (1840-1925), an American jurist and legislator, who rendered his country distinguished service as member of such important arbitration boards as the Joint High Commission between Canada and the United States (1898), the Anthracite Coal Strike Commission (1902), of which he was chairman, and the North Atlantic Coast Fisheries Arbitration at The Hague (1910). He was born at New Castle, Del., was graduated at Princeton College in 1859, and after studying law at Harvard, was admitted to the bar in 1863. From 1879 to 1885 he was attorney-general of Delaware, and in the latter year was elected to the United States Senate. In the Senate, where he served twelve years, Gray was one of President Cleveland's most loyal supporters at times when the President's quarrels with Congress reached the

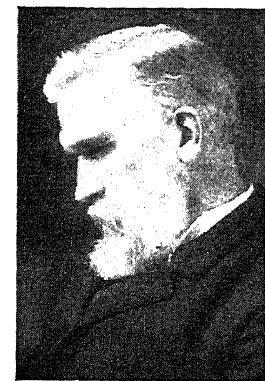


Photo: Brown Bros.

ELISHA GRAY

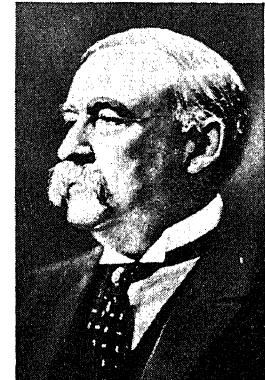


Photo: Brown Bros.

GEORGE GRAY



Photo: Visual Education Service

## THE "CHURCHYARD" OF THE "ELEGY"

The place has changed but little in appearance since the poet's death. Beneath the window rich with ivy is the grave of Gray—an ideal resting place for one who has identified his name forever with its peaceful beauty.

acute stage. He was appointed judge of the United States Circuit Court in 1899, and served until 1914. Under the Hague Convention of 1900, Judge Gray was made a member of the International Permanent Court of Arbitration. See PEACE CONFERENCE, INTERNATIONAL.

**GRAY, HAWTHORNE C.** See AIRCRAFT (First Great Feats in Flying: Altitude Records).

**GRAY, ROBERT.** See OREGON (Exploration).

**GRAY, THOMAS** (1716-1771), an English poet, author of one of the best-known and also one of the most perfect poems in English literature, *Elegy Written in a Country Churchyard*.

In the opening lines of this beautiful poem, Gray revealed himself as herald of the new movement in English literature that came to full flower in the first part of the nineteenth century (see ROMANTICISM):

The curfew tolls the knell of parting day;  
The lowing herd winds slowly o'er the lea;  
The plowman homeward plods his weary way,  
And leaves the world to darkness and to me.

[The third line of this stanza, "The plowman homeward plods his weary way," has been subjected to twenty-six changes in form by students of English.]

Gray was born in Cornhill, London, and studied at Eton College and at Cambridge University.

He left the university without taking a degree, and from 1739 to 1741 traveled on the continent with his friend Horace Walpole, son of England's Prime Minister. Returning to England, he resumed his studies at the university, receiving a degree in 1743. He passed nearly all the rest of his life in Cambridge, devoted to writing and the study of literature. In addition to his talent for English poetry, he was an admirable letter writer, and he composed very good Latin verse. The churchyard that inspired the sublime

*Elegy* belongs to the village church of Stoke Poges, where Gray's mother made her home. The poet is buried in the shadow of the "ivy-mantled tower." The location of his grave is shown in the illustration on this page.



Photo: Brown Bros.

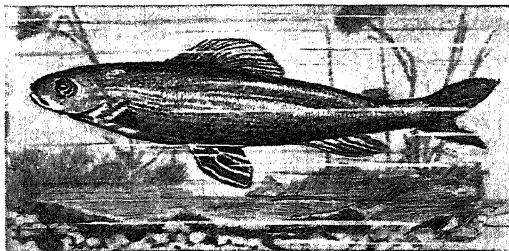
THOMAS GRAY

The publication of his *Elegy*, in 1750, established Gray's fame, and in 1757 he was offered the poet laureateship, which he declined (see **Poet Laureate**).

**Other Works.** In 1750 also appeared his odes, *The Progress of Poesy* and *The Bard*. The latter, a thrilling denunciation of the cruel King Edward, uttered by the last of the Welsh bards, is so filled with the spirit of Romanticism that it is justly considered one of the epoch-making poems of English literature. Then followed *The Fatal Sisters* and *The Descent of Odin*, which helped to bring the literary world to a realization of the romantic beauty of Norse mythology.

**GRAY DUCK.** See **GADWALL**.

**GRAYLING**, "the flower of fishes," so called by Saint Ambrose, the Bishop of Milan. The family contains only five species. All of the graylings are very beautiful, and live in the rivers of cool or Arctic regions. In Europe



THE GRAYLING

they reach a weight of four or five pounds, but in America the specimens rarely exceed one and one-half pounds. They are much like the small salmon in character and habits, but are more slender, graceful, and active. They differ especially in the structure of the skull, for the head is short, the mouth small, and the eyes very prominent, while their scales and dorsal fin are much larger. The three American species, *Arctic*, *Michigan*, and *Montana*, which are about eighteen inches in length, are fine game fish, and their flesh is a great delicacy. The American grayling is found only in the geographical sections which give the names to the three species. L.H.

**Scientific Names.** The Arctic, Michigan, and Montana graylings are known, respectively, as *Thymallus signifer*, *T. tricolor*, and *T. montanus*.

**GRAY MATTER.** See **BRAIN**.

**GRAY'S HARBOR, WASH.** See **WASHINGTON** (Physical Features).

**GRAYSON**, MRS. FLORENCE. See **AIRCRAFT** (First Great Feats in Flying: Made Four Attempts).

**GREAT ABACO**, *ah' bah ko*. See **BAHAMA ISLANDS**.

**GREAT AMERICAN DESERT.** See **UTAH** (The Land).

**GREAT AUGHRABIES, OR HUNDRED FALLS.** See **ORANGE RIVER**.

**GREAT AUSTRALIAN BIGHT**, *aws tra'li an bite*, a bay of the Indian Ocean indenting the south coast of the continent of Australia. Its boundaries are not clearly defined, but it extends almost the entire length of the coast, sweeping northward from Tasmania along the coasts of Victoria and South Australia, to the most southerly point of Western Australia. Numerous bays and gulfs indent the shores of Victoria and South Australia, but on the south of Western Australia, there are few bays and no natural harbors of any importance. The only large river flowing into the bight is the Murray, which carries with it the waters of the Darling and other tributaries.

**GREAT BARRIER REEF.** See **AUSTRALIA** (Coast Line and Islands).

**GREAT BASIN**, a vast area of about 210,000 square miles, in Utah, Nevada, California, and Oregon. It is surrounded by high mountains on every side, and numerous ranges cross it. The valleys are sinks, the largest being Great Salt Lake and Carson and Humboldt sinks. Strange to say, its greatest depressions are at its borders. It contains many streams and lakes, some of the latter being salt. The basin is covered with desert shrubs, but is nearly destitute of trees.

**GREAT BASSA**, a town in Liberia (which see).

**GREAT BEAR.** See **BEAR, GREAT**.

**GREAT BEAR LAKE**, a large lake in the basin of the Mackenzie River, in Northwest



LOCATION MAP

Canada, so called because it lies partly within the Arctic Circle, beneath the constellation

Great Bear. It is about 250 miles east of the Rocky Mountains, on low-lying land, the bottom of the lake being below the level of the Arctic Ocean. It has a very irregular outline, and its area of 11,821 square miles makes it nearly as large as the state of Maryland. The water is very deep, clear, and cold. Fish of many kinds abound, especially the herring-salmon. For seven to nine months each year, the lake is frozen. Fur-bearing animals are trapped in great numbers along its shores. It

is fed by numerous rivers, the most important being the Dease, and is drained by the Great Bear River, which flows into the Mackenzie. In 1825 the second expedition of Sir John Franklin (which see) wintered on the shores of the lake and erected a fort named Fort Franklin, which was afterward occupied as a trading post of the Hudson's Bay Company.

**GREAT BELL OF MOSCOW.** See KREM-LIN.

**GREAT BIBLE.** See COVERDALE, MILES.



**G**REAT BRITAIN, *brit'* n. This largest island of Europe, the "right little, tight little island," as its inhabitants affectionately call it, has acquired an influence that reaches around the world. It is impossible even to imagine what the history of North America, of South Africa, of India, or of Egypt would have been, were it not for the part that Great Britain has played in the history of each. The name Great Britain, as used officially, belongs to the island-mass that is made up of England, Scotland, and Wales, and the near-by Channel Islands, the Isle of Man, etc. These countries and islands, together with Northern Ireland, comprise the United Kingdom. The United Kingdom, in turn, is the nucleus of the world-encircling British Empire and British Commonwealth of Nations, in which the Irish Free State, Canada, Newfoundland, South Africa, Australia, and New Zealand are self-governing units co-equal with the mother country.

Great Britain is a translation of the Latin term *Britannia Major*, which long ago distinguished this land from the French *Britannia Minor*, or Brittany, dimly visible across the Channel. In the fifth century, "Little Britain" was a refuge for Celtic tribes who left their homeland to escape the attacks of barbarous invaders. (The story is told elsewhere under BRITTANY.) Politically, the name Great Britain had no significance until the accession in 1603 of James I, who wanted some title to indicate his entire English and Scottish realm. Not until 1707, however, were England and Scotland united under one Parliament.

[This article deals only with Great Britain as a whole. For the detailed descriptions of the divisions of the United Kingdom, the reader is referred to the articles ENGLAND, IRELAND, SCOTLAND, and WALES. The overseas possessions and self-governing units of the empire are described under their respective titles.]

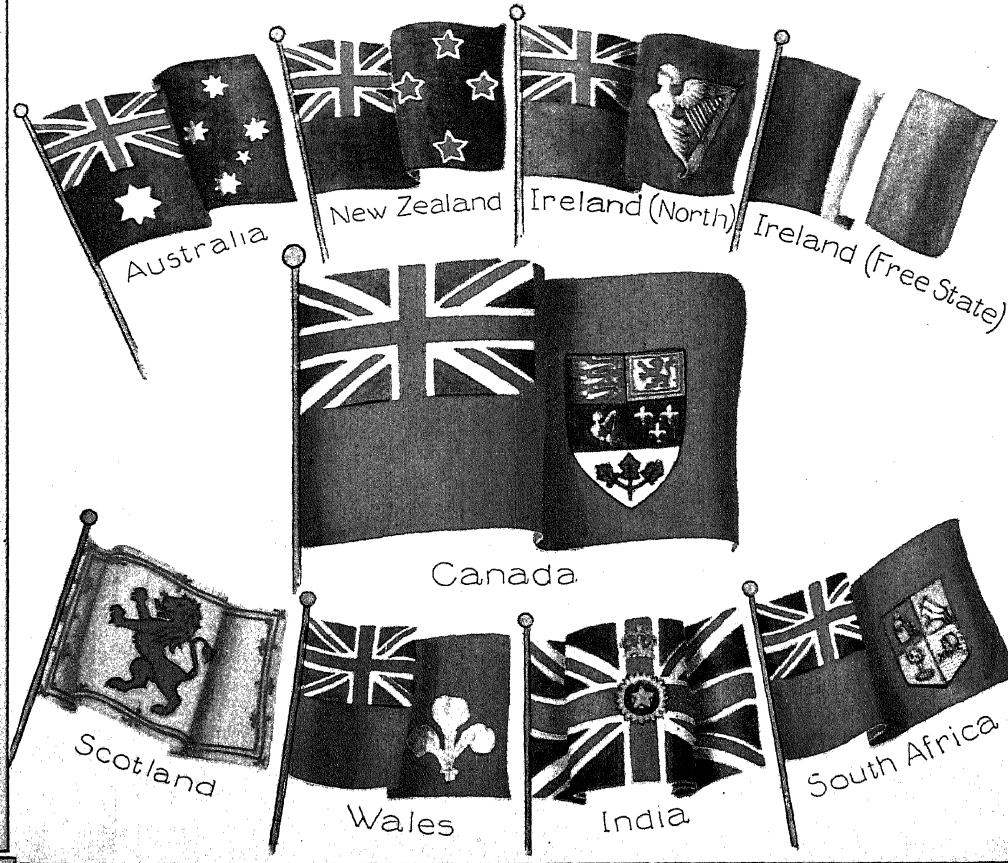
See, also, BRITISH EMPIRE, AND BRITISH COMMONWEALTH OF NATIONS.]

**Size and Location.** The land-mass of Great Britain is eighth in size among the islands of the world; the largest island, Greenland, if Australia be excluded, has an area more than nine times as great as Great Britain's 88,745 square miles. Great Britain is thus nearly twice as large as Pennsylvania, or about one-third as large as the Canadian province of Alberta. Of its area, England constitutes 50,874, Scotland 30,405, and Wales 7,466 square miles. Its greatest length is almost 600 miles, or two-thirds of the distance between New York and Chicago; its greatest breadth is in the extreme south, about 320 miles; while between the Firth of Forth and the Firth of Clyde, it narrows to thirty-two miles.

Great Britain lies in the northwest of Europe, just north of France, and is separated from the Continent by the North Sea, the Strait of Dover, and the English Channel. To the west, and separated from it by North Channel, the Irish Sea, and Saint George's Channel, is another large island, Ireland, which at all times in its history has been closely associated with Great Britain; while all about it are groups of smaller islands, the Orkney, Shetland, Hebrides, Scilly, and Channel Islands, and the Isles of Wight, Man, and Anglesey, which are under its domination.

Its shape and location have given to Great Britain certain advantages which it has utilized to the full. First of all, it has, by reason of its broken shore line and many deep indentations, a very long coast in proportion to its area—over 4,000 miles in all, or one mile to every twenty square miles of area. The vast continent of Africa, with its eleven million square miles and more, has but a little over four times as long a coast line. Because of this pecu-

# "THE SUN NEVER SETS ON THE BRITISH FLAG"





liarity, Great Britain has no point which is over seventy miles from the sea. Navigable rivers, too, decidedly enhance this advantage.

Then there is its location, in the temperate zone, but far enough north so that its northernmost points, where the summers are short, have a compensating length of day—seventeen hours of daylight in some places. Moisture is plentiful, too, because of the proximity of the warm waters of the Atlantic, and not only agriculture, but certain manufacturing industries as well, profit from this. Close to the great countries of Western Europe, it has never lacked for markets to which to send its products, while the fact that it lies between the great land masses of the globe has had much to do with its commercial importance. As noted in the article on England, however, these advantages would have gone for naught had the inhabitants of the island not been the progressive, able people that they are.

**Physical Characteristics.** Though the details of the surface features are given in the articles on the separate political divisions, a brief summary of them as they concern the island as a whole will be of interest here.

As regards elevation, Great Britain has four definite, well-marked regions.

(1) The *Highlands* of Northern Scotland, a rather barren, inhospitable mountain district, which contains among its ridges Ben Nevis, the highest point in the island, which reaches an altitude of 4,406 feet. In this section have developed those silent, rugged people who have preserved for so long their own peculiar customs and dress—the Scottish Highlanders.

(2) The Scottish *Lowlands*, south and east of the mountain region—an agricultural district with rich soil and with mineral wealth which has made possible thriving manufacturing industries. The Lowlands are much more thickly populated than the Highlands.

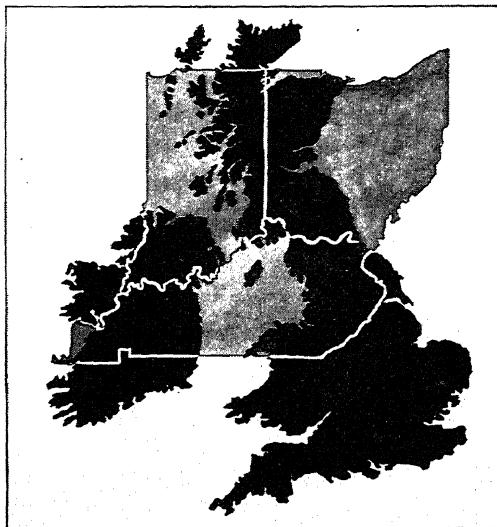
(3) The mountainous region which extends from Southern Scotland across Northwestern England and embraces practically all of Wales. One range of these mountains, the Cheviot Hills, forms a portion of the boundary between England and Scotland. These mountains are not so high as those of the Scottish highlands, nowhere attaining a greater height than 2,600 feet.

(4) The lowlands of England, to the south and east of the mountain district, the greatest agricultural region of the island.

**Mineral Wealth.** This, with the various industries, is treated in the separate articles, but it is worthy of special note here. No other country in all the world has produced anything like so large a total of minerals. To-day, to be sure, the United States far exceeds Great Britain in its coal production, but less than a century ago Great Britain mined each year two and one-half times as much coal as all the rest of the world together, and three-quarters of a century ago it was producing more than half the world's output of iron. The amount of coal produced in the island is not decreasing,

but iron production seems at a standstill, and larger and larger quantities are being imported. If all the people who work in the coal mines of Great Britain could be brought together, they would constitute a city as large as any in the island excepting two, for there are no fewer than 800,000 of them.

**Manufactures.** The history of the growth of



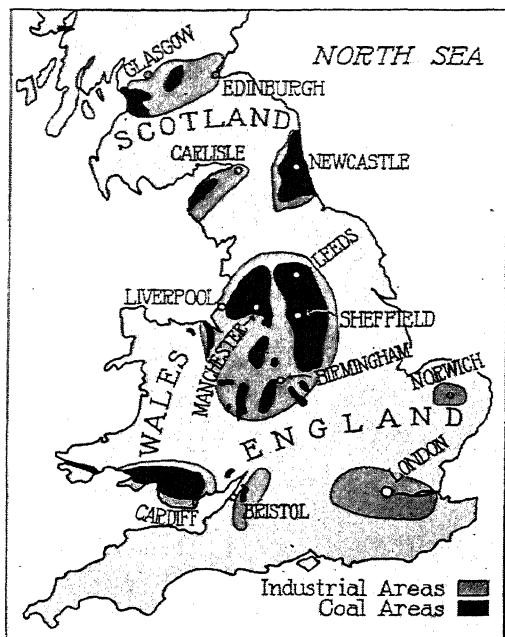
COMPARATIVE AREAS

England, Scotland, Wales, and Ireland have a combined area of 121,331 square miles—less than 4,000 square miles greater in extent than the three states of Ohio, Indiana, and Kentucky. Nevertheless, Britain's power is almost without limits.

manufactures in Great Britain has been one of absorbing interest. In early times, the people of Holland, of France, and of Flanders far surpassed the English in industrial skill and in the amount of manufactured products, and not until after the union of England and Scotland did British supremacy in manufacturing really begin. There were many causes which contributed to this—the abundance of iron and coal, as noted in the article ENGLAND; the growing commerce of the country, which made possible easy distribution; and the peculiar British inventive genius, which gave to the country its labor-saving machines. It was in connection with the installation of machinery in the various factories that there occurred some of the most interesting events in all industrial history. Fear lest machinery would take from them their means of livelihood united with superstition to make the factory people hate the machines, and seldom was one set up without a riot.

[An excellent idea of this turbulent condition is given in *John Halifax, Gentleman*, which describes the difficulties its hero met in trying to introduce machinery.]

For over a century after the factories were reorganized on the new mechanical basis, Great Britain produced more manufactured articles than any other country in the world, but in the latter part of the nineteenth century, the United States had a very remarkable



COAL AND INDUSTRIAL AREAS OF ENGLAND

industrial development, and to-day supremacy in quantity of output belongs to the latter country.

**Transportation and Communication.** Great Britain has, for its size, a large number of navigable rivers, and before the invention of railway transportation much was done to improve these. The country was crossed and recrossed by a network of canals, but since the coming of the railroads, these have been in a large measure neglected. Certain of them, as the Manchester Ship Canal, however, which is wide enough to admit of the passage of two huge seagoing vessels, are still of great importance. The roads are excellent, and while the old coaching days, with their changes of horses at the wayside taverns, are over, the highways have been a great boon to automobileists.

The railroads are the island's chief means of transportation, and Great Britain has the distinction of having possessed the first railway of any importance, that which was opened in 1830 and ran from Liverpool to Manchester. Railroads increased rapidly, and to-day the island has over 20,000 miles of track.

The outbreak of the World War in 1914 had a great influence on the railroads of Great

Britain. Most of these were immediately taken over by the government, and though the general managers were left in control, they were made responsible to the government rather than to the stockholders. The prime consideration demanded was prompt and effective movement of troops, food, and munitions; and ordinary traffic was compelled to take second place. The railroad employees showed great promptness in enlisting for military service, and one road, the North Eastern, sent so many volunteers that these were formed into a separate battalion.

Great Britain has excellent telegraph and postal systems, both of which are owned and controlled by the government. The income of the postal service is greater than its expenditure, but the telegraph service sometimes shows a slight yearly loss.

**Commerce.** Expansion of trade has been at the basis of Great Britain's desire for colonial expansion; protection of trade has been the incentive for its constant insistence upon naval supremacy, and from the time of Queen Elizabeth, British commerce has been steadily growing. The British merchant marine is the largest in the world, and for many years has carried not only the commerce of Great Britain and its colonies, but much of that of other nations as well, including a great deal of the overseas trade of the United States. The imports have increased in value more rapidly than the exports, for certain manufacturing industries which once were carried on almost exclusively in Great Britain have been developed on the Continent as well, and in the United States and Canada. Practically all of the exports are manufactured articles and coal, while the imports are largely foodstuffs and raw materials. The food supply of the island is seldom more than seven weeks ahead of the rate of consumption. Of the countries engaged in trade with Great Britain, the United States is the largest provider of imports; Germany, British India, France, and Argentina ranking next, in that order; while British India and Australia receive the heaviest exports.

**Religion.** Closely associated as they are, England and Scotland differ in their dominant religion [see ENGLAND; SCOTLAND (Religion)]. In England the Established Church is the Church of England, while in Scotland the Presbyterian Church is strongest. It is an interesting fact that the Presbyterians, who originated in Scotland and have there had their stronghold ever since, are in England one of the least numerous of the dissenting sects.

#### Government

Great Britain has not, like the United States, and indeed, like most great countries, a single written Constitution, but its government is none the less a strictly constitutional

form. In fact, England, the outstanding unit of the United Kingdom, has been a leader in developing constitutional government, and many other countries have patterned after it. Much of its Constitution is unwritten—a mass of precedents and decisions which have been built up through the centuries and now have all the force of written laws. There are many documents of the utmost importance, Parliamentary acts, royal decrees, judicial decisions, and, above all, several instruments which are basic. These are the Magna Charta, forced from King John in 1215; the Declaration of Rights in 1689; the Act of Settlement in 1701; the Act of Union with Scotland in 1707; the Act of Union with Ireland; the act establishing the Irish Free State; and the decisions of the conference which recognized the status of the self-governing units. Such a Constitution is far more flexible and easily changed than a single written document drawn up by a constituent assembly, and it is constantly changing.

**Central Government.** The government of Great Britain is a hereditary constitutional monarchy, the preference being given to male heirs.

**Executive Branch.** Nominally, the Crown holds the supreme executive power, and there have been kings in the long course of English history who have actually been all but absolute. One power and privilege after another has been assumed by Parliament, however, and the Crown retains merely such rights and duties as have not been forbidden it by Parliament. Among those powers which still remain to the Crown are the declaration of war (but only upon the determination of the Ministry and Parliament); the making of treaties; the granting of pardons and the issuing of passports; the appointment of diplomatic and many administrative officers; the command of the army and navy; the appointment of high officers in the Church of England, of which the king must be a communicant; and the summoning and dissolution of Parliament. Most of the functions are performed by others in the name of the sovereign. In theory at least, Great Britain has never departed from the doctrine that "the king can do no wrong"—that is, Parliament can never hold him responsible for any of his acts. However, as the spirit of democracy has become more and more manifest, the actual power of the sovereign has decreased. Whereas, a few hundred years ago the king ruled more or less arbitrarily, now for over two hundred years no king or queen has ventured to veto an act passed by the people's Parliament.

Since entire irresponsibility on the part of the executive works for despotism, the actual executive supremacy is vested in the king's advisory body—the *Ministry*, or *Cabinet*, which is directly responsible to Parliament. The Min-

isters must be members of Parliament, and belong to the party which at the time is in the majority in the House of Commons. Custom has outlined the method of procedure thus: The leader of the majority in the House of Commons is invited by the king to choose a Cabinet, usually accepting for himself the post of Prime Minister, or Premier. After consultation with other strong men of his party, this leader sends to the king a list of the men he thinks most suitable as heads of the various departments, and the king at once appoints them. These Cabinet members may be members of the House of Lords or of the House of Commons, but if of the latter, they must immediately resign and come before their constituents for reëlection. Unless they have made themselves extremely unpopular—in which case they would not be likely to be chosen by the leader—they need not fear the results of this election.

These Ministers perform a very important legislative function, for almost every prominent measure brought forward in Parliament is introduced by them. If the Cabinet advances some policy on a serious question and Parliament defeats it, the Ministers must resign, but they have the privilege of requesting at once a new election. If the people refuse to support the policy by reëlecting the Ministers, their resignation becomes unconditional. Strange as it may seem, this body—so important that it may even sign treaties without consulting Parliament—has no mention in any of the various documents which make up the written portion of England's Constitution. No act of Parliament has ever sanctioned it, but it has simply grown up out of the old custom of the kings, more or less informal, of choosing wise men to act as their advisers.

Each Cabinet member is head of an administrative department, but the heads of all departments are not of necessity members of the Cabinet. Eleven department heads are always in the Cabinet, and at times that body has a much larger membership. No records are kept of the meetings of the Cabinet, nor of its acts, on which the history of the empire so largely depends.

[The official posts in the Cabinet are named in an article in these volumes under that heading.]

**Legislative Branch.** The supreme legislative power is vested in a Parliament of two houses—the House of Lords and the House of Commons. In the upper house the peers, or lords temporal, and the archbishops and principal bishops, or lords spiritual, have seats. There are in all somewhat over 600 members.

The House of Commons is an elective body of 615 members, of which England chooses 492, Wales 36, Scotland 74, and Northern Ireland 13. They are chosen by districts for a period



Photo: O R O C

## THE MAJESTIC HOUSES OF PARLIAMENT

The building covers eight acres, and has eleven courtyards, 100 stairways, 1,100 apartments, and two miles of passageways. The side facing the Thames River has a length of 940 feet, and on the river side is the House of Lords. The House of Commons is on the right side of the building. The Victoria Tower, in the foreground, is 336 feet high; the tower in the right background contains the great clock, "Big Ben."

of seven years, and a member need not live in the district from which he is elected. A term of Parliament is seven years, but almost always the body is dissolved before the expiration of that time by the king, upon the advice of his ministers.

[Elsewhere in these volumes, under the title PARLIAMENT, will be found additional information relating to the British legislative system.]

*The Judiciary.* The House of Lords is not only the highest legislative, but the highest judicial, body in the kingdom. If a peer commits a crime or misdemeanor, he is brought before the House of Lords for trial; if any public official is to be impeached, or any case appealed from a lower court is to be reopened, it is this body which has jurisdiction. But in cases appealed from a lower court, the whole House does not act—only the lord chancellor, the four judicial members, and such other peers as may previously have held judicial offices; these peers are known as the Lords of Appeal. A coördinate body is the Judicial Committee of the Privy Council, which consists of practically those same peers who have the right to hear appealed cases in the House of Lords. Before this Judicial Committee are brought cases appealed from the colonies. See PRIVY COUNCIL.

In addition to these, there are the High Court of Justice and Court of Appeal; the

petty sessions and quarter sessions, which are criminal courts; and the assize courts.

*Local Government.* It is difficult for anyone not thoroughly conversant with the local government system of Great Britain to understand it, so complicated and involved is it. Only after the passage of local government acts in 1888 and 1894 had it any right to the name of system, so inconsistent had it always been. The units of government now are counties, boroughs, urban districts, rural districts, parishes, and school districts. In each county there is a lord lieutenant—the representative of the Crown—together with a sheriff, justice of the peace, clerk of the peace, and coroner; and each county has, as well, a council elected by popular vote, which has charge of finances, charities, local education, bridges, roads, and the police system.

Counties are subdivided into *urban* districts and *rural* districts, each with its own council, which has charge of the poor laws and health laws, and other minor matters; and below the district is the *parish*, governed by an assembly consisting of every qualified voter, and this designation includes women. Incorporated towns are known as *boroughs*, and each one has a mayor, aldermen, and councilors, who together form the council. London has special treatment. The county of London, which includes the city, is divided into twenty-nine

boroughs, each of which has the same officers as any other borough. At the head of the whole complex system is a Local Government Board, whose president is sometimes, though not always, a member of the Cabinet. The tendency at present is to increase the jurisdiction of this board.

**Administration of Colonies.** As noted above, the governmental systems applied to the administration of the numerous British colonies are of necessity various. These are outlined in the article **BRITISH EMPIRE, AND BRITISH COMMONWEALTH OF NATIONS.**

**Defense.** The problem of defense presented to Great Britain has been in one way peculiar. Itself an island, but an island with scattered possessions which make it the largest empire in the world, it has needed especially a strong navy, and toward the building of that, attention has been directed with such good results that England, since the decline of Spain centuries ago, has had no rival on the sea. Its policy has been to maintain a navy which should at least equal in strength the combined navies of any two other countries in the world, and toward that end, ships were multiplied rapidly during the latter part of the nineteenth and the first part of the twentieth centuries.

The naval policy was modified in 1921, as a result of the conference on limitation of armaments, held in Washington, when it was agreed that thereafter in capital ships the United States and the British should be on an equal basis. The great merchant marine has been an added resource, for a certain number of seamen have been drilled to render service in the event of war.

But if the navy of Great Britain has been the strongest in the world, the same cannot be said of its army. While on the Continent compulsory military service has been the rule, in Great Britain the principle of voluntary service has been rigidly adhered to, and as a result the British army has been the smallest among all the armies of the great European nations. During the World War, however, conscription called millions to the colors. The forces have been divided, since 1907, into two classes—the regular army, with its reserve and special reserve, and the territorial force, which, contrary to its name, is intended for home defense and is under no obligation to serve abroad. The strength of the armies of Great Britain, as compared with those of the other powers, is given in the article **ARMY (British Army).**

### History of Great Britain

**The Union with Scotland.** Although, as pointed out in the article **ENGLAND**, that country and Scotland had had one ruler from the accession of James VI of Scotland to the throne of England in 1603 as James I, the two countries had retained their separate legislatures and were thus not really one country. In 1707 the Scottish Parliament was given up, and Great Britain as a political unit came into being. A new flag was adopted—the Union Jack, made by combining the white cross of Saint Andrew with the red cross of Saint George. At first there was a strong popular feeling in Scotland against the union, but gradually there arose the realization of the fact that the interests of the country were better conserved than under the old dual arrangement.

[For illustration of the development of the British flag, see color plate, facing page 2922.]

**Accession of the House of Hanover.** Queen Anne was the last Protestant Stuart, and when she died in 1714, the Crown passed, not to her half-brother, the Catholic son of James II, but to George, Elector of Hanover, a descendant of James I. The new king had no interest in England; he had been a German all his life, and a German he intended to remain. He was perfectly willing, to be sure, that the new kingdom should minister to his support and furnish him funds for his enterprises on the Continent; but as for the government, that

could be attended to by the leaders of the Whigs, the party which had brought him to power. It was this very indifference on the part of the king which made possible the establishment of the present form of government, for Sir Robert Walpole, the Whig leader, was in reality the first Premier, though he did not assume that title; and he it was who began the custom of selecting from his colleagues an advisory body, the Cabinet. The king did not even attend their meetings; why should he, when he could not understand a word of English, and did not care to learn the language?

During this reign occurred the insurrection in the interests of James Edward Stuart, the "Pretender," and the failure of that gigantic enterprise known as the South Sea Company, which involved in its disaster great numbers of people and seriously embarrassed the government. Only the genius of Walpole served to bring a certain measure of order out of this crisis. Another important event, as beneficial as this was disastrous, was the introduction of the practice of inoculation for smallpox. This meant the conquest of one of the worst scourges of Europe, for even in years when there was no epidemic, the disease killed off about one person out of ten in England, and a proportionate number in other countries.

**Growth of Colonial Interests.** George II, who came to the throne in 1727, was much like his father in his indifference to English inter-

ests. He hated Walpole, but was wise enough to keep him in power, seldom interfering with him except in attempting to induce him to involve England in the various struggles which were taking place on the Continent; for George II was above all things a soldier. In 1739 the country became so incensed over certain barbarities of Spain toward English traders in the West Indies that Walpole was forced against his will to declare war, and the result was far from favorable for England. This war was a sign that the New World, as it was then called, and England's trading and colonial interests there were becoming of greater importance. In the next war in which England took part—the War of the Austrian Succession—George II led the British troops in person, the last English king to take part in a battle.

But the great struggle of the reign was the Seven Years' War, which in its American phase was known as the French and Indian War. By it England's colonial interests were decidedly advanced at the expense of France; for Clive, by the great Battle of Plassey, established British rule in India on a firm foundation, and Wolfe won Canada by his victory over Montcalm at Quebec. Indeed, at the close of the war, England was supreme over the North American continent from the Atlantic to the Mississippi.

The reign of George II witnessed another movement, less spectacular but as lasting in its results—the rise of Methodism. Such a religious revival was sorely needed in an age which saw nothing strange in such tavern signs as "Drunk for a penny; dead drunk for two-pence; clean straw for nothing."

**The Break with America.** When George III came to the throne in 1760, he proved to be very different from his father and his grandfather. While of excellent character, he desired power, and was unwilling that the ministers should continue to exercise their former authority. The royal will should be asserted, the king should dictate to the ministers instead of their dictating to him—these were the reforms which he was determined to carry through. Pitt resigned and was succeeded by Bute, who in turn gave place to North, a minister completely after the king's own heart; and it was the king and North who advocated those policies which terminated in the outbreak of the American Revolution. The king was unable to see the injustice of taxing the colonies when they had no representation in Parliament, or the folly of keeping them utterly dependent, as it was his aim to do. The necessity of acknowledging the independence of the United States was a great grief to him, nor could he ever be brought to see the unwisdom of his own course. See the article **REVOLUTIONARY WAR IN AMERICA**.

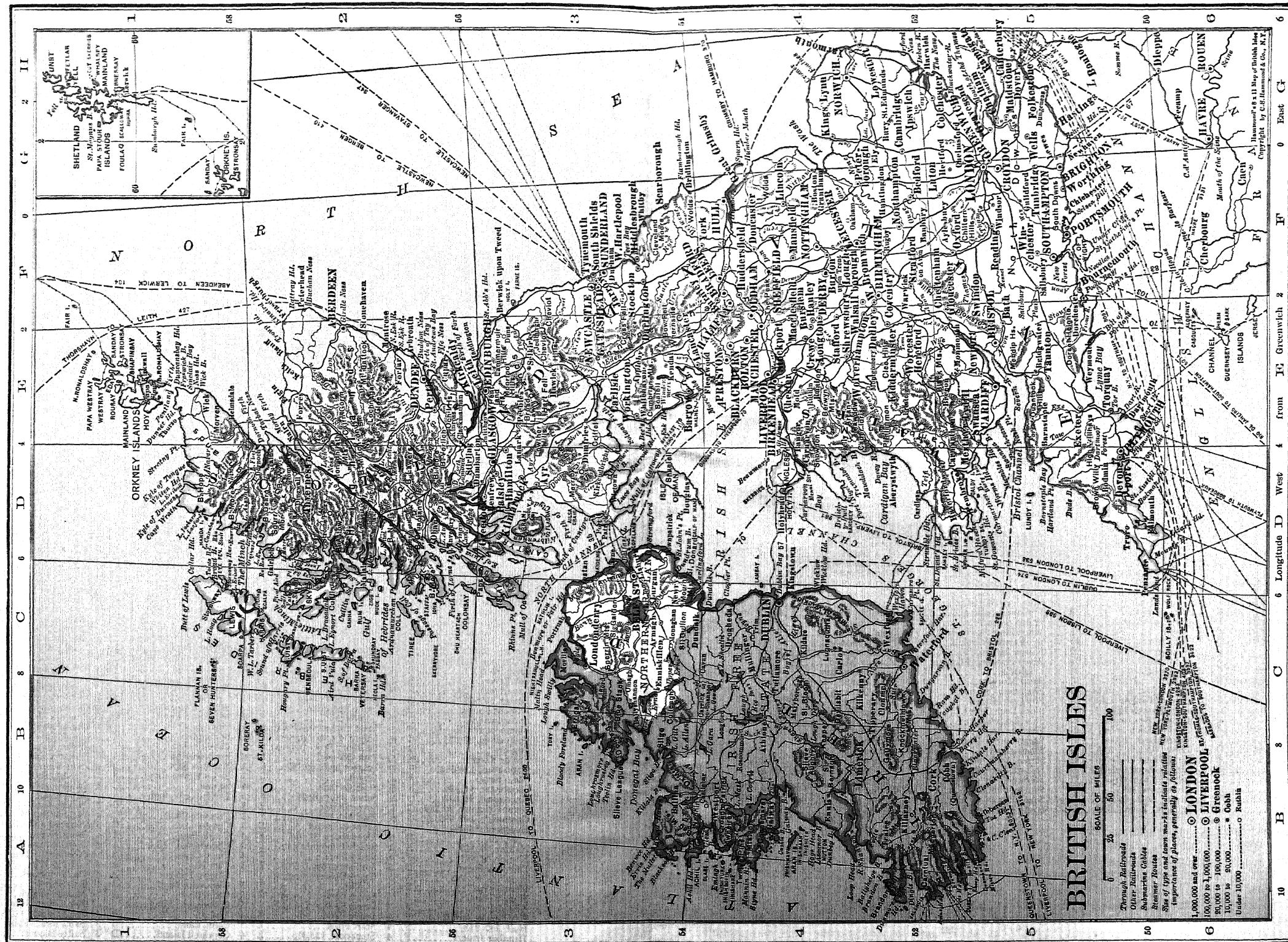
**War with France.** Just at the close of the American Revolution, in 1783, Pitt, son of the earlier minister of that name, was made Premier; until his death, twenty-three years later, his voice was dominant in English affairs. He it was who carried on the war against France, so vigorously that Nelson was able to establish by his victory at Trafalgar the supremacy of England on the sea, and that Wellington was empowered to give a severe blow to Napoleon's cause by driving the French out of Spain. In the Congress of Vienna, which readjusted the affairs of Europe after the long turmoil, England secured very favorable terms, and gained valuable colonial accessions—Helgoland, Malta, Cape Colony, Ceylon, Mauritius, Trinidad, and others of less importance. Some of these Britain already held, but now their possession was confirmed. All the results of the struggle with Napoleon were not beneficial, however, for a large debt was placed upon the people, and taxes were made painfully heavy. This condition had been rendered more serious by a second war which occurred while the first was still in progress—the War of 1812 with the United States.

Another important event took place during the Napoleonic struggle. A revolt in Ireland strengthened the feeling of the English statesmen that that country should be made a part of England, and in 1801 an Act of Union was passed. Pitt made Roman Catholic emancipation a part of his proposal, but to this the king would not consent, nor was it finally secured until 1829.

**The Reform Era.** It is significant of the gradual decrease in the power of the kings that reform measures should have occupied much of the public attention during the reign of George IV (1820-1830), a king who had no interest in reform of any kind. The people, suffering under the heavy burdens laid upon them by the wars, were openly murmuring, and one leader after another found it expedient to listen to their demands. Sir Robert Peel, in 1823, brought about the reform of the criminal laws, doing away with the death penalty for many minor offenses; in 1828 the Duke of Wellington, stanch Tory that he was, brought about the repeal of the obnoxious Test Act; and Roman Catholic Emancipation has been referred to above.

It was after the accession of William IV, in 1830, that the chief reforms were put through. The manner of Parliamentary elections sadly needed reform, and Earl Grey devoted all his energies to bring about a redistribution of the franchise in accordance with population. By inducing William IV to agree to the creation of a number of new peers, he compelled the House of Lords to pass the great Reform Bill of 1832, and he also carried out a number of





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How to Recall it Map: See page xvi, facing text page 1.

# BRITISH ISLES *Continued*

|                                |   |   |                               |   |   |                                       |   |                                |   |   |
|--------------------------------|---|---|-------------------------------|---|---|---------------------------------------|---|--------------------------------|---|---|
| Shannon River.....             | B | 4 | Don River .....               | E | 2 | Lorne, Firth of                       |   | South Uist (island).....       | C | 2 |
| Sheelin, Lake.....             | C | 4 | Doon, river.....              | D | 3 | channel .....                         | C | Spey, River .....              | E | 2 |
| Sheep Head.....                | A | 5 | Dornoch Firth (inlet)         | E | 2 | Lowther Hills .....                   | E | Staffa (island).....           | C | 2 |
| Slaney (river).....            | C | 4 | Duncansay Head.....           | E | 1 | Luce Bay .....                        | D | Stornoway Harbor.....          | C | 1 |
| Sligo Bay.....                 | B | 3 | Dundee, 168,21, . . .         | E | 2 | Lui, Ben (mt.). . .                   | D | Strathmore (region).....       | E | 2 |
| Slyne Head.....                | A | 4 | Dunvegan, Loch (inlet)        | C | 2 | Mainland island.....                  | E | Tay, Firth of (estuary).....   | E | 2 |
| Sperrin Mountains.....         | C | 3 | Dunnet Head.....              | E | 1 | Mainland (island).....                | H | Tiree (island).....            | C | 2 |
| Strangford, Lake.....          | D | 3 | Earn, Loch (lake).....        | D | 2 | Maree, Loch (lake).....               | D | Tolsta Head.....               | C | 1 |
| Suck (river).....              | B | 4 | Eday (island).....            | E | 1 | Merrick (mt.).....                    | D | Tormore Point .....            | D | 1 |
| Suir (river).....              | C | 4 | Edinburgh (capital),          |   |   | Minch, The (strait) .....             | D | Strome Ferry.....              | D | 2 |
| Swilly, Lough (bay).....       | C | 3 | 421,281 .....                 | E | 3 | Monadhliath Mountains                 | D | Stronsay (island).....         | E | 1 |
| Teechin Head.....              | B | 3 | Eigg Island.....              | C | 2 | Moorfoot Hills .....                  | E | Sumburgh Head.....             | H | 1 |
| Toe Head.....                  | B | 3 | Enard Bay.....                | D | 1 | Morar, Loch (lake) .....              | D | Tarbat Ness (point).....       | E | 2 |
| Tory Island.....               | B | 3 | Erisort Loch (inlet).....     | C | 1 | Moray Firth (sound) .....             | E | Tay, Firth of (estuary).....   | E | 2 |
| Trostan (mt.).....             | D | 3 | Erriboll, Loch (inlet).....   | D | 1 | More, Ben (mt.).....                  | D | Tiree (island).....            | C | 2 |
| Twelve Pins (mt.).....         | A | 4 | Arich, Loch (lake).....       | D | 2 | More, Ben (mt.).....                  | D | Tolsta Head.....               | C | 1 |
| Valencia Island.....           | A | 5 | Esk (river).....              | E | 3 | More, Ben (mt.).....                  | C | Torrhidon, Loch (inlet).....   | D | 2 |
| Waterford Harbor.....          | C | 4 | Ewe, Loch (inlet).....        | D | 2 | Morven (mt.).....                     | E | Troup Head .....               | E | 2 |
| Wexford Haven.....             | C | 4 | Eye Peninsula.....            | C | 1 | Muck Island .....                     | C | Tweed (river).....             | E | 3 |
| Wicklow Head.....              | D | 4 | Eynort, Loch (inlet).....     | C | 2 | Muich-dhui, Ben (mt.).....            | D | Unst (island).....             | H | 1 |
| Wicklow, Mountains of.....     | C | 4 | Fair Island .....             | F | 1 | Mull (island).....                    | C | Vaternish Point .....          | C | 2 |
| Youghal Bay.....               | C | 5 | Fannich, Loch (lake) .....    | D | 2 | Naer, Loch (lake) .....               | D | Vetersay (island).....         | C | 2 |
| <b>SCOTLAND D</b>              |   | 2 | Fife Ness (point).....        | E | 2 | Ness, Loch (lake) .....               | D | Vorlich, Ben (mt.).....        | D | 2 |
| Aberdeen, 158,969, . . .       | F |   | Fetlar (island).....          | H | 1 | Nevis, Ben (mt.).....                 | D | West Loch Tarbert (inlet)..... | C | 2 |
| Ailsa Craig (island).....      | D |   | Findhorn River.....           | E | 2 | Nirth (river).....                    | E | Westray (island).....          | E | 2 |
| Aird, Point of.....            | C |   | Fladda (island).....          | D | 3 | North Channel .....                   | D | Whalsey (island).....          | H | 1 |
| Aird Vuln (point).....         | C |   | Flannan Islands (Seven        |   |   | Northern Highlands .....              | D | Whiten Head .....              | D | 1 |
| Annan (river).....             | E |   | Hunters).....                 | B | 1 | North Esk River .....                 | E | Wick Bay.....                  | E | 1 |
| Ardnamurchan Point.....        | C |   | Fleet, Loch (lake) .....      | D | 2 | North Ronaldshay .....                |   | Wigtown Bay .....              | D | 3 |
| Arkaig, Loch (lake).....       | D |   | Forth, Firth of (inlet).....  | E | 2 | (island) .....                        | E | Wrath, Cape .....              | D | 1 |
| Arran (island).....            | D |   | Forth (river).....            | D | 2 | North Uist (island).....              | C | Wyvys, Ben (mt.).....          | D | 2 |
| Assynt, Loch (lake).....       | D |   | Foula (island).....           | G | 1 | Noss Head .....                       | E | Yell (island).....             | H | 1 |
| Atholl (forest).....           | E |   | Freswick Bay.....             | E | 1 | Oa, Mull of (cape).....               | C | Yell Sound .....               | H | 1 |
| Attow, Ben (mt.).....          | D |   | Fyne, Loch (inlet).....       | D | 2 | Ochil Hills .....                     | E | Y-Gloe, Ben (mt.).....         | E | 2 |
| Awe, Loch (lake).....          | D |   | Galloway, Mull of (cape)..... | D | 3 | Orkney Islands .....                  | D |                                |   |   |
| Ayr, 35,741, . . .             | D |   | Girldie Ness (point).....     | F | 2 | Out Skerries (islands) .....          | H | <b>WALES E 4</b>               |   |   |
| Ayr River.....                 | D |   | Glasgow, 1,034,069, . . .     | E | 3 | Pabbay (island) .....                 | C | Anglesey (island).....         | D | 4 |
| Barra Head.....                | C |   | Glen More.....                | D | 2 | Paisley, 84,837 .....                 | D | Arran-Mawddwy .....            | E | 4 |
| Barra, Sound of (channel)..... | C |   | Grampian Mountains .....      | D | 2 | Papa Stour (island) .....             | H | Bardsey Island .....           | D | 4 |
| Barra (island).....            | C |   | Greenock, 81,120, . . .       | D | 3 | Papa Westray (island) .....           | E | Beaumaris Bay .....            | D | 4 |
| Barrow Head.....               | D |   | Gruinard Bay .....            | D | 2 | Paps (mt.) .....                      | C | Berwyn Mountains .....         | E | 4 |
| Battock, Mount.....            | E |   | Hamilton, 39,420, . . .       | D | 3 | Pentland Firth (sound) .....          | E | Black Mountains .....          | E | 5 |
| Benbecula (island).....        | C |   | Handa Island .....            | D | 1 | Pentland Hills .....                  | E | Brachy-Pwll (cape) .....       | D | 4 |
| Boreray (island).....          | B |   | Harris (island) .....         | C | 2 | Perth, 33,208 .....                   | E | Burry Inlet .....              | D | 5 |
| Bracadale, Loch (inlet).....   | C |   | Harris, Sound of .....        | C | 2 | Rattray Head .....                    | F | Cader-Idris .....              | E | 4 |
| Breadalbane (region).....      | D |   | Hebrides, Gulf of .....       | C | 2 | Rhins Point .....                     | C | Caldy Island .....             | D | 5 |
| Bressay (island).....          | H |   | Hebrides (islands) .....      | C | 2 | Rhu Stoer .....                       | D | Cambrian Mountains .....       | E | 4 |
| Broad Bay .....                | C |   | Hecla Island .....            | C | 2 | Roag, Loch (inlet) .....              | C | Cardiff, 200,262 .....         | E | 5 |
| Broad Law (mt.).....           | E |   | Highlands .....               | D | 2 | Rannock, Loch (lake) .....            | D | Cardigan Bay .....             | D | 4 |
| Broom, Loch (inlet).....       | D |   | Holy Island .....             | D | 3 | Rattray Head .....                    | F | Carmarthen Bay .....           | D | 5 |
| Buchan Ness (point).....       | F |   | Hope, Ben (mt.) .....         | D | 1 | Rhins Point .....                     | C | Carnarvon Bay .....            | D | 4 |
| Buddon Ness (point).....       | E |   | Hougray Point .....           | C | 2 | Rhu Stoer .....                       | D | Dee River .....                | E | 4 |
| Burra (island).....            | H |   | Hoy (island) .....            | E | 1 | Saint Andrews Bay .....               | E | Dovey River .....              | D | 4 |
| Inchard, Loch (inlet).....     | D |   | Inchard, Loch (inlet) .....   | D | 1 | Saint Kilda (island) .....            | B | Great Ormes Head .....         | E | 4 |
| Cairnbawn, Loch (inlet).....   | D |   | Inner Sound .....             | D | 2 | Saint Magnus Bay .....                | H | Holy Island .....              | D | 4 |
| Cairn Gorm (mt.).....          | E |   | Iona (island) .....           | C | 2 | Saint Non's Head .....                | E | Mawddach River .....           | D | 4 |
| Caledonian Canal.....          | D |   | Islay (island) .....          | C | 3 | Sanday (island) .....                 | E | Menai Strait .....             | D | 4 |
| Canna (island).....            | C |   | Jura (island) .....           | D | 3 | Saundray (island) .....               | C | Merthyr Tydfil, 80,161, . . .  | E | 5 |
| Cantyre (peninsula).....       | D |   | Jura, Sound of .....          | D | 2 | Scalpay (island) .....                | C | Milford Haven (estuary) .....  | D | 5 |
| Cantyre, Mull of (cape).....   | D |   | Keith .....                   | E | 2 | Scapa Flow (sea basin) .....          | E | Mumbles Head .....             | D | 5 |
| Carron, Loch (inlet).....      | D |   | Ken (river) .....             | D | 3 | Scapa Flow (inlet) .....              | C | Nash Point .....               | E | 5 |
| Cellar Head .....              | D |   | Kilbrennan Sound .....        | D | 3 | Scarpa (island) .....                 | C | Nigel, Port .....              | D | 4 |
| Cheviot Hills.....             | E |   | Kilmarnock, 35,756, . . .     | D | 3 | Seven Hunters (Flannan Islands) ..... | B | Plynlimmon (mt.) .....         | E | 4 |
| Clay, Loch (inlet).....        | C |   | Kinaird Head .....            | F | 2 | Skate Loch (inlet) .....              | C | Porth-cawn .....               | E | 5 |
| Clyde, Firth of (estuary)..... | D |   | Kirkcaldy, 39,591, . . .      | E | 2 | Scarpas (mt.) .....                   | D | Ramsey Island .....            | D | 5 |
| Coll (island).....             | C |   | Kyle of Durness (inlet) ..... | D | 1 | Sgurr Mor (mt.) .....                 | D | Saint Brides Bay .....         | D | 5 |
| Coll, Passage of (strait)..... | C |   | Kyle of Tongue (inlet) .....  | D | 1 | Shapinsay (island) .....              | E | Saint David's Head .....       | D | 5 |
| Colonsay (island).....         | C |   | Lammernuir Hills .....        | E | 3 | Shetland Islands .....                | G | Saint Gowans Head .....        | D | 5 |
| Cree (river).....              | D |   | Lawers, Ben (mt.) .....       | D | 2 | Shiel, Loch (lake) .....              | D | Severn (river) .....           | E | 4 |
| Criffel (mt.).....             | E |   | Laxford Loch (inlet) .....    | D | 2 | Sinclair's Bay .....                  | E | Skerries (islands) .....       | D | 4 |
| Crinan Canal.....              | D |   | Leven, Loch (lake) .....      | E | 2 | Skerryvore (island) .....             | C | Skomer Island .....            | D | 5 |
| Cruachan, Ben (mt.).....       | D |   | Lewis (island) .....          | C | 1 | Stromness (island) .....              | C | Snowdon (mt.) .....            | D | 4 |
| Cuillin Hills.....             | C |   | Lewis, Butt of (point) .....  | C | 1 | Skye (island) .....                   | C | Strumble Head .....            | D | 4 |
| Cuillin Sound.....             | C |   | Linnhe, Loch (inlet) .....    | D | 2 | South Esk River .....                 | E | Turbot Bank .....              | D | 5 |
| Dearg, Ben (mt.).....          | D |   | Little Minch (strait) .....   | C | 2 | South Ronaldshay .....                | E | Worms Head .....               | D | 5 |
| Dee River.....                 | E |   | Lochnagar (mt.) .....         | E | 2 | South Uist (island) .....             | C | Wye (river) .....              | E | 4 |
| Deveron River.....             | E |   | Lochy, Loch (inlet) .....     | D | 2 | Spey, River .....                     | E |                                |   |   |
| Dhu Heartach.....              | C |   | Lomond, Loch (lake) .....     | D | 2 | Staffa (island) .....                 | C |                                |   |   |

minor reforms. Slavery in the colonies was abolished in 1833, and beneficial changes were made in the poor laws and the factory laws.

Queen Victoria was only a girl when she came to the throne in 1837, but she had the wisdom to adopt at the very outset of her reign the policy which she pursued to the end—the policy of allowing her ministers to deal with political matters without her interference. Her moral influence, however, and that of her husband, Prince Albert, were very plainly felt in every department of national life. Her long reign was glorious, and the list of its statesmen includes Peel, Bright, Cobden, Russell, Palmerston, Salisbury, Disraeli, and Gladstone (whose biographies are given in these volumes). Note-worthy among the reforms of the early part of the reign was the repeal of the Corn Laws in 1846; while among the reform measures of the later period of her reign was the Act of 1867, which broadened the franchise and gave the workingmen a voice in the government. The country was making strides toward democracy.

The life of the country was practically revolutionized during the period that Victoria was on the throne. At the beginning, there were but a few miles of railway in the kingdom, and there was not a telephone or a telegraph line; before its close, railways ran everywhere, people talked to each other from end to end of the kingdom, and messages flew over thousands and thousands of miles of wire.

**Wars of the Reign.** It had been the policy of England since the early nineteenth century not to be drawn into wars unless it was absolutely necessary, but struggles could not always be avoided. There was the Crimean War of 1854-1856, in which England successfully engaged in checking the ambitious designs of Russia; the Sepoy mutiny of 1857, which had as its result the transfer of India from the authority of the East India Company to that of the Crown; and the South African War of 1899-1902, which resulted in the annexing of the Transvaal and the Orange Free State to the empire as colonies. Each of these wars is treated under its own title.

**The Twentieth Century.** More than ever before, it was noticeable during the reign of Edward VII (1901-1910), son of Queen Victoria, that Great Britain was an empire in more than name. The colonies had shown their loyalty during the war in South Africa, and they began to give evidence in other ways of the fact that they felt themselves to be a part of one great empire. The Australian colonies were federated in 1901 into a Commonwealth, but the relations with the mother country were closer and more cordial than ever before. During Edward's reign, a crisis was reached in Parliamentary affairs, the question of the veto power of the House of Lords becoming acute. Edward's death and

the accession of his son, George V, in 1910, caused a temporary cessation in the strife over the budget question, but in 1911 there was passed a bill which made a greater change in Parliamentary affairs than had any legislation since the Reform Bill of 1832. This was the removal from the upper house of the permanent veto power. It declared not only that the upper house had no right to amend or reject a financial bill, but that any bill which was passed by the Commons at three successive sessions became a law despite the disapproval of the House of Lords.

The early years of the reign of George V were marked by severe labor troubles in 1911 and 1912, including a number of serious strikes; the disestablishment of the Church of England in Wales in 1914; and the passage of the act allowing home rule to Ireland. Out of this Home Rule Bill there grew a disturbance in the Irish province of Ulster, which for a time was very acute. The Orangemen there refused to countenance home rule, because it would mean the dominance in the island of the Roman Catholic faction, and actual civil war was averted only by the outbreak of a greater struggle—the World War, which began in 1914.

*Great Britain and the War.* The violation of Belgian neutrality by Germany was announced by Great Britain as the cause which led it to declare war on Germany on August 3, 1914. Possibly never before in all its history had the nation been so entirely united on any great matter. The military events of this conflict are treated in the article WORLD WAR.

The Irish question was settled in 1921 by the organization of the Irish Free State, though a considerable minority demanded a republic and entire independence. By 1922, after civil warfare, the Free State majority gained support which guaranteed the success of the movement. Protestant Northern Ireland was separated from the Free State, and given its own Parliament.

In 1925 Britain joined in a conference at Locarno; out of it developed treaties guaranteeing security among Great Britain, France, Germany, Italy, Poland, and Czechoslovakia. In 1926 occurred another great coal strike, which paralyzed industry for several months, but conditions were not improved.

Russian propaganda in behalf of world proletariat revolution, in Europe aimed particularly at Great Britain, gave officials great concern continuously, because the Soviet authorities held the sympathies of the radical element of the Labor party. Radical adherence to communism for a time could not be shaken by such conservative Labor leaders as J. Ramsay MacDonald, who in 1924 headed England's first Labor government, but in 1927 English labor severed all relations officially with the Soviet.

## OUTLINE AND QUESTIONS ON GREAT BRITAIN

### Outline

#### I. Size and Location

- (1) Rank among islands of the world
- (2) Actual size, 88,745 square miles
- (3) Situation with reference to Europe
- (4) Effect of shape and position

#### II. Physical Features and Industries

See outlines on ENGLAND, SCOTLAND,  
WALES

#### III. Transportation and Commerce

- (1) Navigable rivers
- (2) Canals—neglected state
- (3) Railroads
- (4) Foreign trade
  - (a) Effects of, on history and on naval supremacy
  - (b) Merchant marine largest in world
  - (c) Imports greater than exports

#### IV. Colonial Possessions

- (1) Extent of empire
- (2) Protectorates
- (3) Colonies
  - (a) Self-governing
  - (b) Crown colonies
- (4) Government

#### V. Government

- (1) Unwritten law

#### (2) Central government

- (a) King
- (b) Cabinet
- (c) Parliament
  - 1. House of Commons
  - 2. House of Lords
- (d) Courts

#### (3) Local government

- (4) Defense
  - (a) Army
  - (b) Navy

#### VI. History

For early stages, see ENGLAND, SCOTLAND,  
WALES

- (1) Union with Scotland
- (2) The accession of the Hanoverians
- (3) Spread of empire
  - (a) In America
  - (b) In India
- (4) Revolutionary War in America
- (5) The Napoleonic struggle
- (6) An era of reform
- (7) Later happenings
  - (a) Imperial growth
  - (b) South African War
  - (c) Irish Home Rule question
  - (d) World War
  - (e) Imperial conference

### Questions

To what extent are the dominions of Canada, Newfoundland, Australia, and New Zealand and the Union of South Africa and the Irish Free State actually independent?

What happens to the Cabinet when an important measure is defeated?

Sketch briefly the part which Great Britain has played in the development of Australia; of North America.

How can the country be governed without a written constitution?

What part has British inventive genius played in bringing about the great growth of the country?

If Great Britain were deprived of all that has grown out of the victories of Clive and Wolfe, how much smaller would the empire be?

Why was there objection to Irish Home Rule in Ireland itself?

How many islands as large as Great Britain would its greatest colonial possession make?

What king of England could not speak English?

Show by means of a globe that "the sun never sets on British soil."

Describe the British flag. How was it made?

How does the merchant marine of Great Britain rank with those of other countries?

What is the largest single industry in the United Kingdom?

How does Northern Ireland differ from the Irish Free State in government?

In 1926 occurred a momentous decision respecting the empire. In the Imperial Conference of that year, the dominions of Canada, Newfoundland, Australia, and New Zealand, and the Union of South Africa and the Irish Free State were granted freedom of political action and became independent units within the empire, equal in power with the mother country.

In May, 1929, Premier Baldwin's government was defeated, and for the second time James Ramsay MacDonald, the Labour leader, became Premier of Great Britain. Late in that year he visited the United States on a mission of world peace. E.D.F.

**Related Subjects.** Of the numerous articles in these volumes which are connected with the subject of Great Britain, many are listed in their proper places under ENGLAND, IRELAND, SCOTLAND, WALES. The following list will simplify reference not only to those topics but to the following as well:

## CITIES AND TOWNS

See lists under ENGLAND, IRELAND, SCOTLAND, WALES.

## GOVERNMENT

|   |                      |
|---|----------------------|
| Cabinet   | Magna Charta         |
| Emperor   | Mandated Territories |
| Exchequer, Chancellor of the                              | Navy (British)       |
| Flag  | Parliament           |
| Home Rule   | Premier              |
| Imperialism   | Privy Council        |
| King  | Privy Seal           |
| For more general topics, see list under CIVIL GOVERNMENT. |                      |

## HISTORY

For earlier history, see lists of *Related Subjects* under ENGLAND, IRELAND, SCOTLAND, WALES.

|                           |                              |
|---------------------------|------------------------------|
| Alabama, The              | Louisburg, Sieges of         |
| Balaklava                 | Navigation Acts              |
| Bering Sea Controversy    | Orders in Council            |
| Black Hole of Calcutta    | Paris, Treaties of           |
| Boston Massacre           | Powers, The Great            |
| Boston Port Bill          | Quebec, Battle of            |
| Boston Tea Party          | Quebec Act                   |
| Brandywine, Battle of the | Quebec Resolutions           |
| British Empire            | Renunciation of War          |
| Brunswick, Family of      | Revolutionary War in America |
| Bunker Hill, Battle of    | Rotten Boroughs              |
| Chartism                  | Rulers (see ENGLAND)         |
| Clayton-Bulwer Treaty     | Sepoy Rebellion              |
| Continental System        | South African War            |
| Corn Laws                 | South Sea Company            |
| East India Company        | Stamp Act                    |
| Fifteen Decisive Battles  | Stuart, Charles Edward       |
| French and Indian Wars    | Test Acts                    |
| Ghent                     | Trafalgar                    |
| Hay-Pauncefote Treaty     | Trent Affair, The            |
| Home Rule                 | United Kingdom               |
| Intolerable Acts, Five    | Vienna, Congress of          |
| Jay Treaty                | War of 1812                  |
| Knox, John                | Waterloo, Battle of          |
| League of Nations         | Webster-Ashburton Treaty     |
| Leipzig, Battles of       | World War                    |
| Locarno Conference        |                              |
| London Company            |                              |

## SOLDIERS AND STATESMEN

|                            |                       |
|----------------------------|-----------------------|
| Abercrombie, James         | Baldwin, Stanley      |
| Aberdeen, Earl of          | Balfour, Arthur James |
| André, John                | Braddock, Edward      |
| Argyll, Dukes of           | Bright, John          |
| Asquith, Herbert Henry     | Bryce, James          |
| Baden-Powell, Robert S. S. | Burgoyne, John        |
|                            | Burke, Edmund         |

|  |  |
|--|--|
| Carleton, Sir Guy  | Marlborough, Duke of   |
| Chamberlain, Joseph  | Milner, Alfred   |
| Chesterfield, Earl of  | Monck, Lord Charles  |
| Churchill, Winston L. S.   | Moore, Sir John  |
| Clinton, Sir Henry   | Morley, John   |
| Clive, Robert  | North, Lord  |
| Cobden, Richard  | O'Connell, Daniel  |
| Cornwallis, Charles  | Outram, Sir James  |
| Curzon, Lord   | Pakenham, Sir Edward M.  |
| Drake, Sir Francis   | Palmerston, Viscount Lord  |
| Dufferin and Ava, Marquis of   | Peel, Sir Robert   |
| Fox, Charles James   | Pitt, William  |
| Gage, Thomas   | Reading, Earl  |
| Gladstone, William E.  | Redmond, John Edward   |
| Gordon, Charles George   | Rhodes, Cecil John   |
| Grey, Charles  | Roberts, Earl  |
| Grey, Sir Edward   | Rosebery, Archibald P. P.  |
| Hastings, Warren   | Russell, John  |
| Howe, Lord Richard   | Salisbury, Marquis of Shaftesbury, Earl of Walpole, Horace Wellington, Duke of Wilberforce, William Wolfe, James Wolsey, Garnet Joseph |
| Howe, Sir William Hutchinson, Thomas Jameson, Leander Starr Kitchener, Earl Lansdowne, Lord Lloyd George, David Macaulay, Thomas Babington MacDonald, James R. |  |

## ISLANDS

See classified list under article ISLAND.

## PRODUCTS

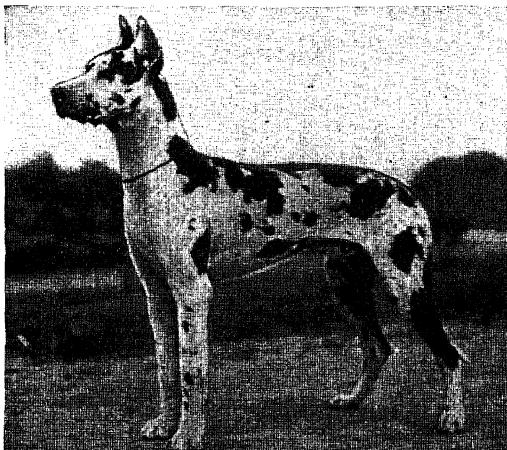
See lists under ENGLAND, IRELAND, SCOTLAND, WALES.

## RIVERS

See lists under ENGLAND, IRELAND, SCOTLAND, WALES.

**GREAT CHARTER.** See MAGNA CHARTA.  
**GREAT COMMONER,** a term applied to William Jennings Bryan in the United States and to William Pitt in England. See their biographies, in these volumes.

**GREAT DANE**, a large dog noted for its great strength, agility, and handsome appearance. The breed originated in Denmark, where



THE GREAT DANE

the dogs were formerly used for hunting boars and deer. Great Danes vary greatly in color, the most highly prized usually being fawn or brindled, but a dark bluish-gray is popular. They are usually about the same size as mas-

tiffs, often weighing 100 pounds, and make affectionate and faithful companions. See DOG.

M.J.H.

GREAT EASTERN, the seagoing vessel that was used in laying the Atlantic Cable. See SHIP; CABLE, SUBMARINE; FIELD (Cyrus West).

GREAT ELECTOR. See FREDERICK WILLIAM.

GREATER ANTILLES, *an til' eez*. See ANTILLES.

GREATEST COMMON DIVISOR. The greatest common divisor (G. C. D.) of several numbers is the largest number which will exactly divide each of them; for example, 14 is the G. C. D. of 42, 70, and 98; 3 is the G. C. D. of 15, 24, and 21.

The greatest common divisor is also called the *highest common factor*. (See FACTORING and study it in connection with this subject.)

$$8 \times 13 = 104$$

$$5 \times 13 = 65$$

$$3 \times 13 = 39$$

$$7 \times 13 = 91$$

$$104 \div 13 = 8$$

$$65 \div 13 = 5$$

$$39 \div 13 = 3$$

$$91 \div 13 = 7$$

(a) We see here how 104, 65, 39, and 91 are built up, 13 being the factor common to all; being, moreover, the only factor common to all, it is the highest common factor.

(b) Since 13 is the largest factor common to these numbers, it is the largest number that will divide each of them.

(c) The *largest common factor* that goes to make up several numbers is the *largest divisor* that is found in each of the numbers.

(d) Therefore, in seeking the G. C. D. we seek for the *highest common factor*.

(1) Find the G. C. D. of 16, 40, 72. Factoring, we see:

$$16 = 2 \times 8$$

$$40 = 5 \times 8$$

$$72 = 9 \times 8$$

and recognize 8 as the G. C. D.

(2) Find the G. C. D. of 75, 45, 105, 135.

$$75 = 5 \times 5 \times 3$$

$$45 = 3 \times 5 \times 3$$

$$105 = 7 \times 5 \times 3$$

$$135 = 3 \times 5 \times 3 \times 3$$

Here we find  $5 \times 3$ , or 15, to be the G. C. D.

(3) Find the G. C. D. of 672, 504, 924.

$$672 = (2 \times 2) \times 2 \times 2 \times 2 \times 3 \times 7$$

$$504 = (2 \times 2) \times 2 \times 3 \times 3 \times 7$$

$$924 = (2 \times 2) \times 3 \times 7 \times 11$$

We see that  $(2 \times 2)$  is common, and 3 is common, and 7 is common to all the numbers as a divisor; therefore  $(2 \times 2 \times 3 \times 7)$ , or 84, is the G. C. D.

If the young student has difficulty in seeing this, he will find it helpful to write the factors in this way:

$$672 = 2 \times 2 \times 2 \times (2 \times 2 \times 3 \times 7)$$

$$672 = 8 \times 84$$

$$\begin{array}{rcl} 504 & = & 2 \times 3 \\ 504 & = & 6 \\ 924 & = & 11 \\ 924 & = & 11 \end{array} \quad \begin{array}{l} \times (2 \times 2 \times 3 \times 7) \\ \times 84 \\ \times (2 \times 2 \times 3 \times 7) \\ \times 84 \end{array}$$

Below it is seen that we may break up the numbers into their *composite* factors, and from these find the G. C. D.

$$225 = 15 \times 15$$

$$150 = 10 \times 15$$

$$375 = 25 \times 15$$

15 is common, and there is the common factor 5 in 15, 10 and 25. So we know that 75 is the G. C. D. and we see:

$$225 = 3 \times 75$$

$$150 = 2 \times 75$$

$$375 = 5 \times 75$$

We may find the common prime factors in this way:

|         |     |     |
|---------|-----|-----|
| 5   225 | 150 | 375 |
| 5   45  | 30  | 75  |
| 3   9   | 6   | 15  |
|         | 3   | 5   |

5, 5, and 3 are the common divisors, and their product,  $5 \times 5 \times 3$ , or 75, is the G. C. D.

When numbers are *prime to each other*, their G. C. D. is 1; in other words, they have no G. C. D.; for example 7, 20 and 9.

When the factors of several numbers cannot be found at sight, nor by using tests for divisibility of numbers, the following method is used for finding the G. C. D.:

Find the G. C. D. of 4633, 697, and 943.

$$(a) \begin{array}{r} 6 \\ \hline 697 \end{array} \overline{)4633} \quad \begin{array}{r} 6 \\ \hline 451 \end{array} \overline{)697} \quad \begin{array}{r} 6 \\ \hline 246 \end{array} \overline{)451} \quad \begin{array}{r} 6 \\ \hline 205 \end{array} \overline{)246} \quad \begin{array}{r} 6 \\ \hline 205 \end{array} \overline{)205} \quad \begin{array}{r} 6 \\ \hline 205 \end{array} \overline{)205}$$

$$(b) \begin{array}{r} 23 \\ \hline 41 \end{array} \overline{)943}$$

$$\begin{array}{r} 23 \\ \hline 82 \end{array}$$

$$\begin{array}{r} 23 \\ \hline 123 \end{array}$$

$$\begin{array}{r} 23 \\ \hline 123 \end{array}$$

(a) proves that 41 is the G. C. D. of 4633 and 697; since (b) shows that 41 is also a divisor of 943, it follows that 41 is the G. C. D. of 4633, 697, and 943.

J.W.Y.

GREAT EXUMA, *ek soo' mah*. See BAHAMA ISLANDS.

GREAT FALLS, MONT. See MONTANA (back of map).

GREAT ICE BARRIER. See ANTARCTIC LANDS AND SEAS.



MAP OF THE GREAT LAKES

The largest cities on the lakes, and smaller towns with important steamer lines, are shown. For locations of the international boundary, see maps with the articles on the individual lakes.

**GREAT INAGUA, *e nah' gwah*.** See BAHAMA ISLANDS.

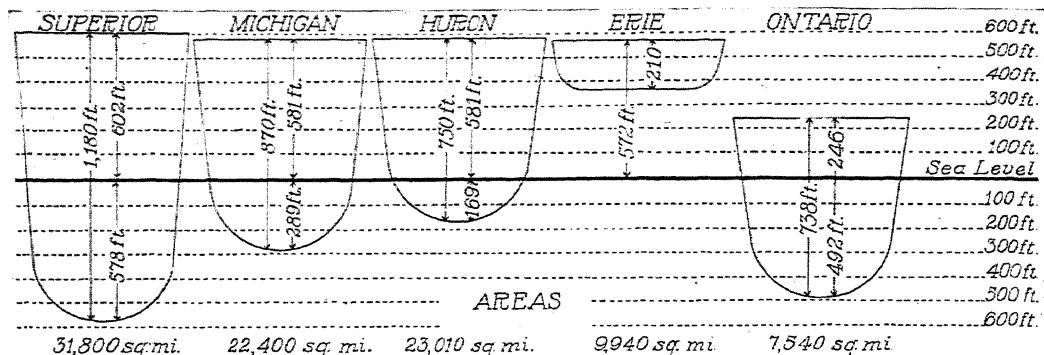
**GREAT KANAWHA, *ka naw' wah*, RIVER,** an important tributary of the Ohio River, and one of the chief waterways of the state of West Virginia. It rises between the Blue Ridge and the Iron mountains in North Carolina, where it is known as the New River, and takes a northeasterly direction through part of Virginia and West Virginia. After traversing a portion of the Allegheny Mountains, it joins the Ohio River at Point Pleasant, 450 miles from its source. The river is navigable from the Ohio to within a few miles of the mouth of its chief tributary, the Gauley River, a distance of about 100 miles.

**GREAT LAKES, THE.** The traveler on a steamer making the trip between Duluth, at the head of Lake Superior, and the Canadian city of Kingston, Ont., at the foot of Lake Ontario, will enjoy a most interesting journey of 1,245 miles. When the boat reaches the eastern end of Lake Superior to make the passage into Lake Huron, it will encounter the dashing rapids of the Saint Mary's River, the stream connecting the two lakes. From the upper lake to the river there is a drop of about twenty feet. Navigation there would be impossible were it not for the magnificent system of canal locks constructed around the rapids by the American and Canadian govern-

ments (see SAULT SAINTE MARIE CANALS). On the Canadian side there is one lock, and on the American side four.

Through the locks the boat steams out on the quiet waters of the Saint Mary's River, passing by its green and wooded banks for a distance of fifty miles, until Lake Huron is reached. Numerous vessels are seen along the course; of these there are none more interesting than the enormous steel boats whose long, boxlike holds are filled with vast quantities of grain and ore from the Northwest. The largest of these carry 10,000 tons. They offer a decided contrast in appearance and use to the magnificent passenger steamers which give thousands of tourists, every summer, a taste of life on the sea.

From Lake Huron the boat passes through the Saint Clair River, Lake Saint Clair, and the Detroit River, into Lake Erie. The greatest descent of the entire trip is reached at the eastern end of Lake Erie, for the drop from that body of water into Lake Ontario is more than fifteen times as great as that at the rapids of the Saint Mary's. Here are located the famous falls of the Niagara River (see NIAGARA FALLS AND RIVER), and to overcome this obstruction to navigation, the Canadian government has built, several miles west of the Niagara, the Welland Ship Canal (see WELLAND CANAL). Should the traveler desire, he



## THE GREAT LAKES

Elevations above sea level, total depths, and areas.

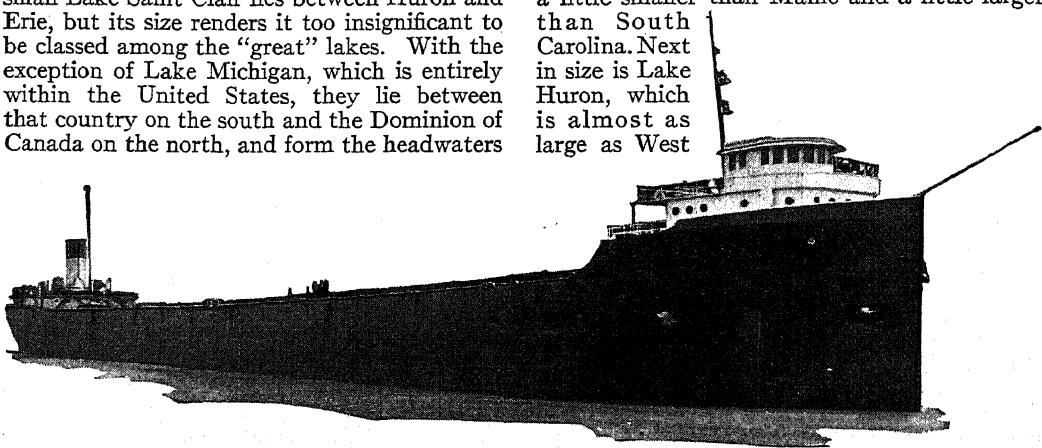
could continue his journey to the Atlantic Ocean by way of the Saint Lawrence River. Passenger boats often make the trip down the rapids of that great stream, but freight is carried through canals that have been built around the rapids. Buffalo, south of Niagara Falls, is connected with Albany, N. Y., by the famous New York State Barge Canal.

The Great Lakes offer to the summer tourist trips of great variety and interest, and there have been built along their shores numerous thriving resorts. The lakes are diversified by many beautiful bays and islands, famous among which are Georgian Bay, an arm of Lake Huron, and Mackinac Island, at the northwest extremity of that lake (see GEORGIAN BAY; MACKINAC ISLAND).

These five great inland seas of North America, surpassing in area any other series of fresh-water lakes in the world, comprise one of the most important commercial waterways on the globe. They are known as lakes Superior, Michigan, Huron, Erie, and Ontario. The small Lake Saint Clair lies between Huron and Erie, but its size renders it too insignificant to be classed among the "great" lakes. With the exception of Lake Michigan, which is entirely within the United States, they lie between that country on the south and the Dominion of Canada on the north, and form the headwaters

of the Saint Lawrence River system. By this stream they are drained into the Atlantic Ocean. The deepest channel of the lakes forms the boundary line between the United States and Canada. The great valley in which they lie is situated on the southern slope of the Height of Land, which extends from ocean to ocean across the North American continent; the land to the north of the rim of their basin slopes toward Hudson Bay, and that to the south toward the Gulf of Mexico.

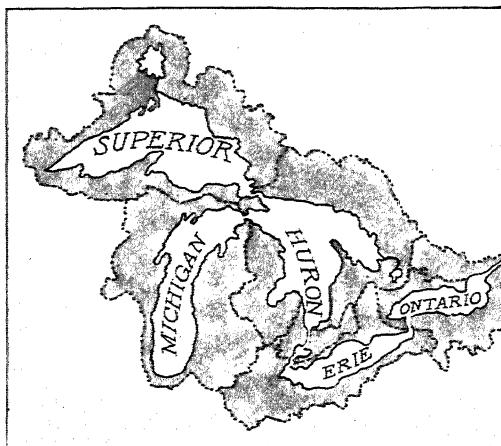
**Size and Elevation.** The Great Lakes have a combined area of about 94,000 square miles, which is more than 27,000 square miles in excess of the total area of the six New England states, and about one thirty-ninth that of the Dominion of Canada. Rhode Island, the smallest state in the Union, could be placed on this area seventy-five times, and there would still be over 1,000 square miles to spare. The area of England, Scotland, and Wales combined is not quite as great as that of these five fresh-water seas. Lake Superior, the largest, is a little smaller than Maine and a little larger than South Carolina. Next in size is Lake Huron, which is almost as large as West



AN ORE VESSEL SIX HUNDRED FEET LONG

Such boats carry iron ore from the Lake Superior region to steel-manufacturing centers in Wisconsin, Illinois, Ohio, Indiana, and Pennsylvania.

Virginia. Lake Michigan has an area equal to that of Maryland, Massachusetts, and Delaware combined. Then comes Lake Erie, the



DRAINAGE BASIN

The area of drainage into each of the lakes is approximately correct, as indicated; the map shows that only a comparatively small area in Canada and the United States drains into the Great Lakes. However, sometimes the water level is raised to a point dangerous to shore cities.

most shallow of the five, which is about the size of Vermont. Lake Ontario, the smallest, is not quite as large as New Jersey. The elevation of the lakes varies from about 600 feet in Lake Superior to 247 feet in Lake Ontario, the most decided drop being between Lakes Erie and Ontario, where there is a descent of 326 feet. The accompanying map and diagram show relative positions, areas, depths, and heights above sea level. In addition, each of these lakes is described in these volumes under its title.

**The Great Lakes Commerce.** The Great Lakes form a highway of immense commercial importance. On their waters may be found one-half the tonnage of the United States merchant marine, and every year there passes through the Detroit River one-tenth of the tonnage of the water-borne commerce of the entire United States. The shipping through the Sault Sainte Marie Canals exceeds that through the Suez Canal. The bulk of the freight carried on the lakes consists of iron ore, coal, lumber, grain, flour, package freight, and copper. It is generally admitted that the intensive development of the great ore deposits on the shores of Lake Superior, near Duluth, and in Northern Michigan and Wisconsin, is due to the cheap and convenient means of transportation furnished by the Great Lakes. These waters are also fully as important in supplying cheap shipping facilities for the enormous wheat crops of the Canadian Northwest.

These inland seas give a shore line to eight states of the Union, having a combined population of over one-third that of the entire country. Each year more than 24,000 vessels enter the six principal lake ports—Chicago, Buffalo, Cleveland, Milwaukee, Detroit, and Duluth.

A noble fountain symbolizing the five Great Lakes, designed by Lorado Taft, stands on the southern side of the Art Institute, Chicago.

B.M.W.

**GREAT LAUREL.** See RHODODENDRON.

**GREAT LIBERATOR.** See BOLIVAR, SIMON.

**GREAT MEADOWS, BATTLE OF.** See WASHINGTON, GEORGE (*Life on the Frontier*).

**GREAT MOGUL.** See DIAMOND (Famous Diamonds).

**GREAT NATIONAL PIKE.** See CUMBERLAND ROAD.

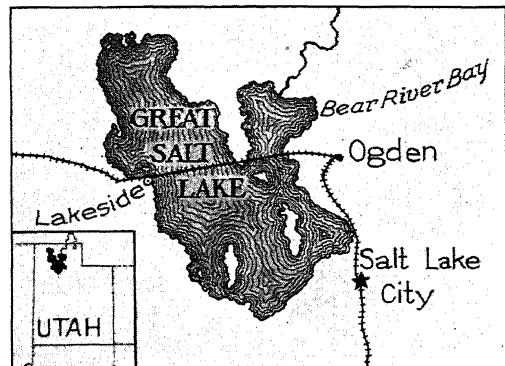
**GREAT PACIFICATOR,** a name applied to Henry Clay (which see).

**GREAT PEASANT WAR,** another name for Peasant War (which see).

**GREAT PEDEE.** See SOUTH CAROLINA (Rivers).

**GREAT SALT DESERT.** See PERSIA.

**GREAT SALT LAKE,** one of the natural wonders of the world, lying in a region of great scenic beauty, in the northwestern part of the state of Utah. The mountainous character of the surrounding country has revealed an interesting story to geologists. Ages ago there was an immense body of water in this region, as large as Lake Huron. This has been called



GREAT SALT LAKE

The route of the Lucin Cutoff is shown. The small black area in the corner map gives the location of the lake in the state.

**Lake Bonneville.** It was gradually dried up by the evaporation of its waters, leaving a number of smaller lakes, of which Great Salt Lake is the largest and most important.

This lake is seventy-five miles long and about fifty miles wide, and covers an area of about 1,750 square miles, nearly one and one-half times that of Rhode Island. The area varies, however. In winter, when more water



Photo: Keystone

LOOKING ACROSS ONE END OF GREAT SALT LAKE

comes to the lake, there is less evaporation. The amount of yearly rainfall or snowfall and the amount of water of tributary streams used for irrigation also affect the area.

One of the most remarkable features about the lake is that, though it has no connection with any sea or ocean, and is formed and maintained by rivers of fresh water, it is a salt sea, 4,218 feet above sea level; it is, in fact, five and a half times as salty as the oceans. At the present rate of consumption, it has been estimated that there is enough salt in solution in the waters of Great Salt Lake to supply the United States for an uncounted number of years. About 40,000 tons

are gathered each year, by pumping the water to about ten feet above the lake and letting it flow by gravity to ponds about two miles distant, where it is evaporated by the heat of the sun.

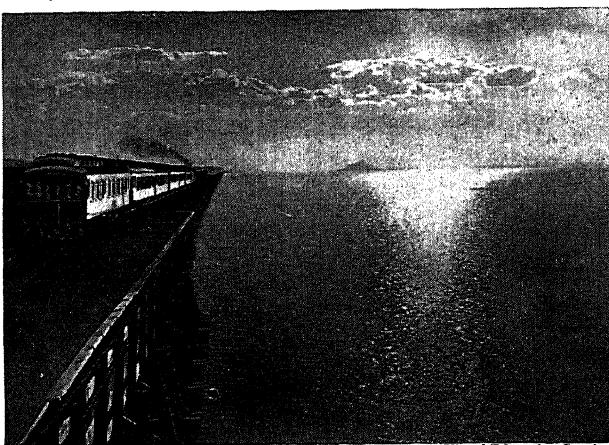
The chief rivers feeding Great Salt Lake are the Jordan, the Weber, and the Bear. The Bear is 400 miles long, but its mouth is only ninety miles from its source. Those waters contain so little salt it cannot be discovered

by taste. But because Great Salt Lake has no outlet, the waters brought to it evaporate, and the solid matters which were dissolved in them remain.

Within this lake are several islands which, like its shores, are whitened by salt. On these, immense flocks of gulls, ducks, geese, and pelicans breed each year. On Antelope Island, the largest, alfalfa is being cultivated and cattle are raised. There are no fish in the waters, but the lake contains a small brine shrimp. A tiny fly also lives there while it is still a grub.

Photo: Visual Education Service

THE LUCIN CUTOFF



A celebrated pleasure resort, Saltair, is built 4,000 feet out in the lake. Tourists enjoy bathing in the clear salt water, which is so dense with dissolved mineral matter it is impossible for a person to sink. Another point of interest is the railroad crossing the center of the lake, over the Lucin Cutoff. This road connects Lucin, at the west, with Ogden, 103 miles to the east. For twelve miles the road follows a trestle; the remainder is on a solid foundation built upon beds of salt.

The Mormons were the first to use the salt from the lake, and thus to found a great in-

dustry. In addition to common salt, Glauber's salt (which see) is also obtained in great quantities. See UTAH (Rivers and Lakes).

**GREAT SAND DESERT.** See PERSIA.

**GREAT SCISM.** See GREEK CHURCH.

**GREAT SEAL OF THE UNITED STATES.** See UNITED STATES (Government).

**GREAT SHOALS.** See CUMBERLAND RIVER.

**GREAT SLAVE LAKE,** in the northwestern part of Canada, covers an area of 10,719



LOCATION MAP

square miles. This water area is more than a thousand square miles larger than Massachusetts and Rhode Island combined, and one and a half times as large as Lake Ontario. The lake lies about 250 miles south of the Arctic Circle, 300 miles southeast of Great Bear Lake, and 500 miles north of Edmonton, Alta. The shore line is very irregular, rugged and barren on the north, and with well-wooded slopes on the south and west. The water is deep, clear, and cold; and the surface of the lake is dotted with numerous islands. Fish of many varieties abound. The lake is frozen for more than half the year, but is navigable from July to October, when great quantities of lumber are shipped from the western shores. The lake is a favorite resort of trappers, for large numbers of fur-bearing animals are caught in the vicinity.

Great Slave Lake is a part of the Mackenzie system, the greatest river system in Canada. Through it the lake receives from the north the surplus waters of Lake Aylmer and several smaller bodies; its chief source of supply is the Slave River, which brings from the south the

surplus waters of the Peace River and the Athabaska system. From Great Slave Lake, in turn, issues the Mackenzie (which see).

**GREAT SLAVE RIVER,** an important link in the great Canadian Mackenzie system (see MACKENZIE RIVER). As an outlet of Athabaska Lake, it flows in a northward direction from Alberta, across the Northwest Territories, and empties into Great Slave Lake, from which the Mackenzie River emerges. Just below Athabaska Lake, the Great Slave River receives the waters of the Peace River, which is also considered a part of the Mackenzie system. From Athabaska Lake to Great Slave Lake the river has a total length of about 300 miles, and through all but thirteen miles of its course it is navigable for steamers, except in the icebound winter months.

**GREAT SMOKY MOUNTAINS.** See NORTH CAROLINA (The Land).

**GREAT SMOKY MOUNTAINS NATIONAL PARK.** See PARKS, NATIONAL.

**GREAT SPHINX, *sphinx*.** See SPHINX.

**GREAT STONE FACE.** See NEW HAMPSHIRE (The Land); WHITE MOUNTAINS.

**GREAT TREK.** See UNION OF SOUTH AFRICA (History).

**GREAT TURQUOISE,** *tur koiz'*, or *tur'-kwoiz*, the only existing prehistoric mine in the southwestern part of the United States. See NEW MEXICO (Mining).

**GREAT VALLEY,** the area between California's eastern and western ranges of mountains. See CALIFORNIA (Surface Features).

**GREAT WALL OF CHINA.** See CHINA.

**GREBE, *greeb*,** the name of a family of diving birds of very interesting habits and ap-

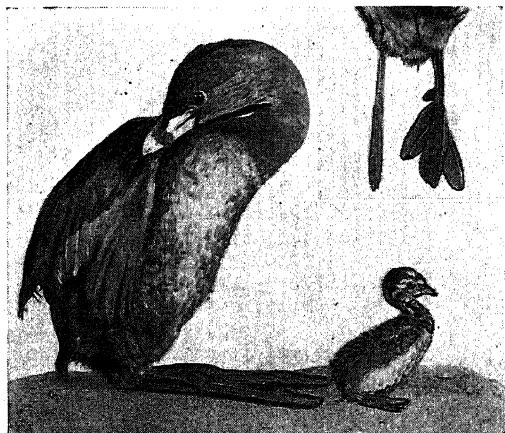


Photo: Visual Education Service

#### THE PIED-BILLED GREBE AND YOUNG

Inset: Foot of this bird, open and shut. It is seen that in the water it has a powerful stroke.

pearance. Grebes are distributed all over the world, and of the twenty or more species, six



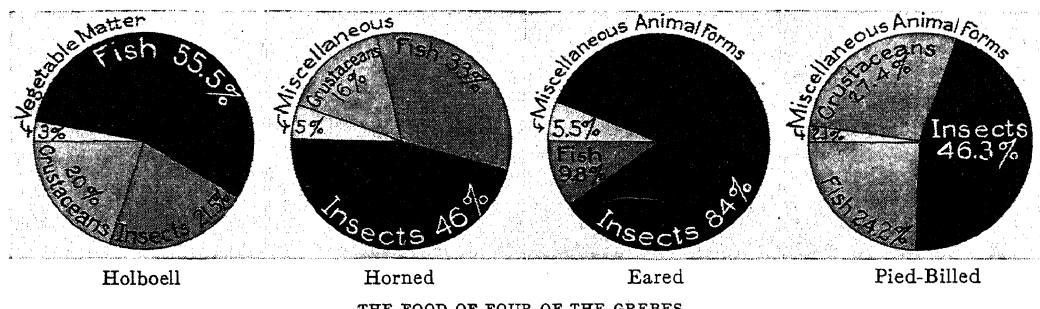
Photo: Visual Education Service

FLOATING NESTS OF THE HORNED GREBE

are found in North America. Generally speaking, grebes are birds with long, flattened bodies, covered with close, dense plumage that is completely waterproof. Instead of having webbed feet, they possess a separate membrane for each toe. Their wings are short, their tails barely visible, and their legs are placed so far back on the body that the birds are extremely awkward on land. When taking to wing, they have difficulty in getting a start, but can fly long distances once they get a momentum.

tached to the bottom or to rushes, so that an ordinary summer wind will not move it; but the eggs are always wet. The several chalky-white eggs are covered over with water-soaked vegetable matter when the bird leaves the nest. The young swim as soon as hatched, but when tired, seek a resting place among the wing feathers of the mother. Grebes feed on fish and other water creatures.

The North American species of grebe are the large *western*, the red-necked *Holboell*, the



THE FOOD OF FOUR OF THE GREBES

In the water, however, grebes dive and swim with wonderful agility, earning such descriptive names as *hell diver* and *water witch*. Formerly, many were slaughtered for their breast feathers, much sought by milliners. Grebes are now protected by law, and are increasing in numbers, though the draining of marshes and shallow lakes in the West is restricting their nesting places.

The grebe builds its nest of decaying, water-soaked vegetation. The nest may be built up from the bottom in shallow water, or it may float among the rushes. It is generally at-

horned, the *eared*, the small *Mexican*, and the widely distributed *pied-billed*.

D.L.

**Scientific Names.** The grebes constitute the family *Colymbidae*. The western is *Aechmophorus occidentalis*; the Holboell, *Colymbus holboelli*; the horned, *C. auritus*; the eared, *C. nigricollis californicus*; the Mexican, *C. dominicus brachypterus*; the pied-billed, *Podilymbus podiceps*.

**GRECHANINOFF**, *greh cha ni' nowf*, ALEXANDER (1864), a Russian composer, born in Moscow. He produced two symphonies, two stringed quartets, and two operas, *Dobrinya Nikitch* and *Soeur Beatrice*.



In the days of Pericles



Returning from market

**G**REECE. Long a kingdom, but a republic since 1924, Greece occupies the easternmost of the southern peninsulas of Europe. It does not rank among the great powers, but it has a heritage more glorious than that of any other nation; for in the days when the ancestors of the present-day English, Germans, and French were still living in barbarism, Greece was the one great country of the world. Its art, its literature, and its government were highly developed—so highly that all the modern countries in all the centuries since have been able to make little advance upon them. When Greece is referred to, most people think not of present-day Greece, with its strictly modern problems to meet, but of ancient Greece, with its beautiful buildings, its inspired poets, sculptors, and architects, and its wars. The writings of the modern authors of Greece have never replaced those of Homer, Aeschylus, or Euripides; its most magnificent modern structures have never rivaled the Parthenon, the Erechtheum, or the Theseum.

### Ancient

It is common to speak of Greece as a *country*, but it was not such in ancient days, in the sense in which England or the United States is to-day. It consisted, during the greater part of its history, of a number of little independent states, which were frequently struggling with each other for supremacy. The geography of the peninsula accounted in large measure for this; tall mountains, with their steep valleys, divided the little plains, on which the various settlements had grown up, and these prevented that free intercourse which might have resulted in a federation or empire. Very often, when the term *Greek* is used in connection with art or civilization, it is *Athenian* which is meant, for it was Athens which conferred upon Greece much of its glory. The distinction, however, is no longer sharply made.

**The People.** The inhabitants of this wonderful land of myth and history were called by the Romans *Greeks*, but their name for themselves had always been *Hellenes*, a certain mysterious Hellen having been their ancestor,

Since 1912 the area of Greece has been practically doubled, as a result of the Balkan Wars of 1912-1913, the World War, 1914-1918, and the Treaty of Lausanne (1923), all of which increased the area of Greece from a total of about 25,000 square miles to nearly 50,000 square miles. The population has also increased from about 2,600,000 to approximately 6,200,000. Any statement of the area of Greece includes that of the numerous islands of the Aegean Sea, which are, industrially as well as historically, closely bound up with the mainland.

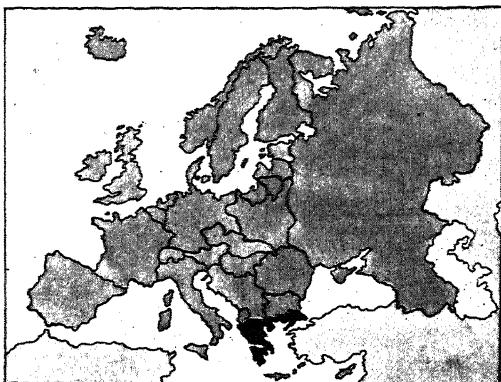
If it had not been for these "stepping stones" from Greece eastward to Asia Minor, the Greeks would hardly have been tempted so early to cross the Aegean and found their colonies on the eastern shore. These colonies had a very great influence on the history of Greece, for they proved a strong temptation to the kings of Persia, and thus involved Athens and its allied cities in their epoch-making struggle with that country.

### Greece

according to the popular legend. Related though they held themselves to be, there were four well-defined Hellenic families or tribes, the *Achaeans*, the *Aeolians*, the *Ionians*, and the *Dorians*. The two last-named families were most important in historic times. All of these Hellenes had an intense pride in their race and their ancestry, and looked with a pitying contempt upon the *barbarians*, as they called all non-Greek people.

It is difficult to make general statements about the ancient Greeks, so widely did they differ among themselves in certain respects. It may be recorded, however, that the Athenians and all their neighbors in Attica were quick and bright, while the Boeotians were so slow and dull-witted that their name has become proverbial for stupid people. Again, the Athenians loved luxury, and they embellished their homes and their city, but the Spartans reduced life to its very simplest terms, and cared only for that which made for perfect physical health (see ATHENS; SPARTA). But of

practically all the ancient Greeks it may be said that they loved beauty with an intensity so great that anything ugly caused them positive pain. The modern proverbs that "Beauty is only skin deep" and "Handsome is as hand-



LOCATION MAP

Fair Greece! sad relic of departed worth!  
Immortal, though no more; though fallen, great!

some does" would have found no response in the Greek mind, for to them goodness without beauty was a thing difficult to conceive. It was because of this love of the beautiful that the Greeks became the supreme architects and sculptors of the world (see ARCHITECTURE; SCULPTURE), and that their poets stand among the greatest of all time (see HOMER; SAPPHO).

**Religion.** The Greeks were a religious people by instinct, and in early times their veneration for the gods was profound and sincere. The Apostle Paul, in his sermon on Mars Hill, declared, "Ye men of Athens, I perceive that in all things ye are too superstitious," or, as later translations give it, "very religious." Of late years much attention has been paid to the religion of the ancient Greeks; scholars study it because of the light it throws on history and on Greek life, and general readers find it fascinating because of its story quality. For these people with the wonderful imagination wove about their gods and heroes countless tales which still keep the freshness of those early days in which they were first told [see MYTHOLOGY (Greek and Roman)]. It is impossible to consider the literature or the art of Greece without reference to its mythology, for the poet sang his loftiest hymns to the gods, or told of their adventures in stately verse; the architect reared exquisite temples to them, their power and beneficence being his inspiration; and the sculptor carved them, from the least to the greatest, in marble. The great Greek festivals, too, grew out of the worship of the gods, and both tragedy and comedy had their origin in religious observances.

To be sure, the Greek gods were not such beings as a modern worshiper could bow down

to; they were jealous, lustful, and revengeful, moved in all things by their own desires; but they were always ready to reward real homage paid to them.

**Education.** The Spartans had worked out for themselves a system of education which differed from every other system in Greece, as well as from those of modern states. Parents had not first claim on their children; these belonged to the state. Baby boys were examined by a Council of Elders, and if they were defective or weakly, they were placed on the open hillside to die. The result was a race which closely attained to physical perfection. At the age of seven the boys were turned over to public officers, and their education was begun. They did not learn to read and write, or to care for literature; they were not encouraged to become orators, or even to converse, for practically all of their education was physical. To bear intense pain without flinching, to endure privation, to fight, to run, to wrestle—all of these the Spartan boy was carefully taught, for Sparta was a nation of warriors and cared for no citizens who could not strengthen the military arm.

In Athens and the remaining Greek states, on the other hand, a far more rounded system of education prevailed. Many private schools existed, and in these the boys were taught gymnastics, reading, writing, arithmetic, music, and, in their later years, rhetoric and philosophy.

Education, in every Greek state, was all for the men. Although the women were not abused, they by no means held such a dignified position in their world as modern women have gained. They were not closely confined,

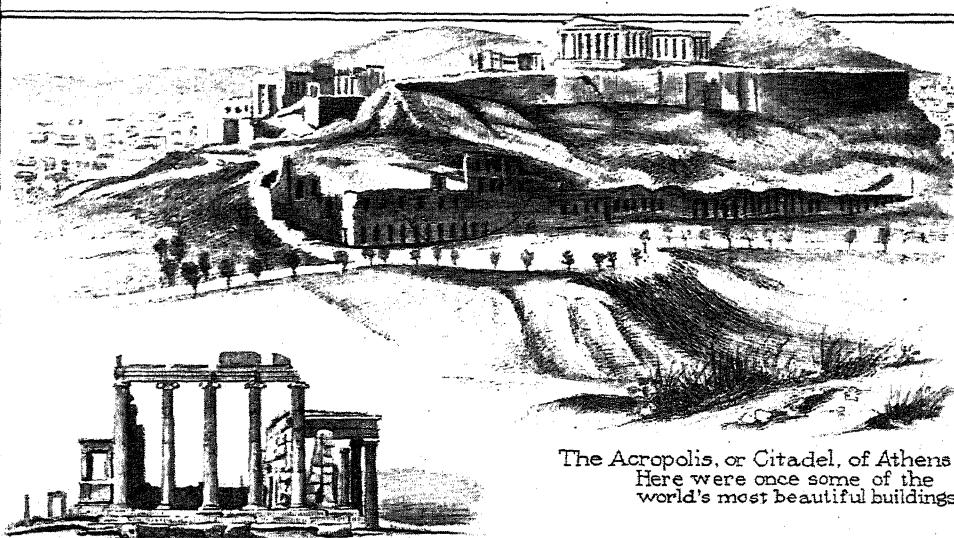


COMPARATIVE AREAS

This little country is about equal in area to the state of Tennessee.

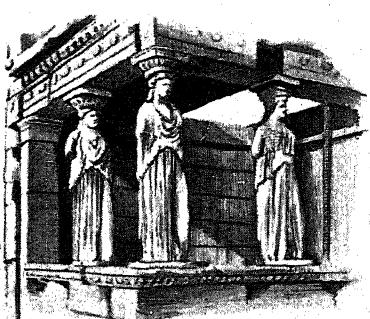
but they were not allowed to appear frequently in public, or even to mingle with mixed gatherings in their own homes. If it be true, as so often said, that "a civilization can rise no higher than the status of its women," this was a serious fault in Greek culture.

# The GLORY that was GREECE



The Acropolis, or Citadel, of Athens  
Here were once some of the  
world's most beautiful buildings

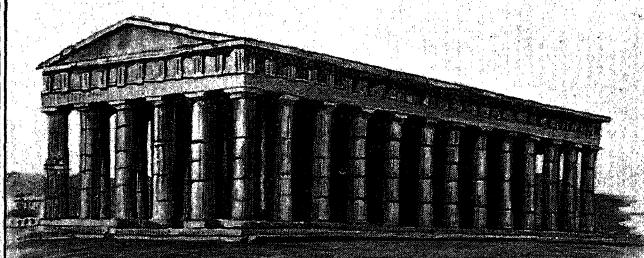
The Erechtheum



The Porch of the Maidens (Caryatides)  
Location shown on left of picture above



The Parthenon  
Probably the most perfect  
building ever erected



The Theseum  
Well preserved after nearly 2400 years



Temple to Wingless Victory  
(Nike Apteros)

**Slavery.** This was the great curse of Greece. Incredible as it may seem, there were many more slaves in the larger industrial centers of Greece than freemen, nor were the slaves always of inferior birth or intelligence. All captives of war were made slaves, and many debtors became the chattels of their creditors. In general, the slaves were fairly well treated, and sometimes a man of decided intelligence,

### Modern

**The People.** The English poet Byron, who loved Greece better than his native land, wrote sadly:

The isles of Greece, the isles of Greece,  
Where burning Sappho loved and sung;  
Where grew the arts of war and peace,  
    Where Delos rose, and Phoebus sprung!  
Eternal summer gilds them yet,  
But all except their sun is set

Anyone who takes up the study of modern Greece, after studying its ancient history, feels a touch of the same sadness. When the Greeks lost their freedom and became subject to Rome in 146 B.C., they seemed to lose many of their best qualities also. The independence and vigor which seem so characteristic of dwellers in mountainous country disappeared, and the Greeks became a fawning, treacherous people, utterly untrustworthy in business dealings. The old love for beauty degenerated to a large extent into a fondness for display; and the contempt for manual labor, which was permissible enough when there was a large body of slaves, manifested itself in an overwhelming desire for easy official positions. After Greece threw off the yoke of Turkey, however, there appeared a remarkable change for the better, and under the influence of the freer institutions, the higher qualities of the ancient Greeks are being reborn in these modern descendants.

The population of Greece is now more homogeneous than it was before the World War. The movements of populations which have taken place have decreased the Turkish and Slavic elements which formerly constituted a minority problem, while more than a million Greek refugees have been added to the country's population. In the nineteenth century, over 300,000 Greeks emigrated to the United States, and the money which they sent or carried back to their old homes was a real asset to the country.

**Principal Cities.** There are only three cities of Greece whose population exceeds 100,000—Athens, the capital; Saloniki, in Macedonia; and Piraeus, the port of Athens. The city of Patras, the second port of Greece, claims about 52,000, and there are numerous others that range in population between 25,000 and 10,000. As Greece is primarily a farming

like Aesop [see AESOP'S FABLES (Aesop)], held a position of honor in the household. This was not true in Sparta, where most of the serfs were terribly oppressed, and where there was constant fear of their revolting.

**History.** The history of the ancient Greeks is told under *History*, below. The detailed stories of ATHENS and SPARTA are related under those titles.

### Greece

country, its towns are chiefly market centers. A detailed description of Athens will be found in these volumes under its title. Descriptions of the two important cities, Saloniki and Piraeus, follow:

**Piraeus,** *pi re' us*, the port of Athens, was famed in ancient times as one of the master works of the Age of Pericles (which see). It was built in 493 B.C., was connected with Athens by the famous Long Walls, and was destroyed in 86 B.C. At present it is a modern city, situated about five miles southwest of Athens, and has three excellent harbors. It is a port of call of steamship lines, and is in direct communication with New York City, Trieste, Constantinople, Smyrna, Marseilles, and Alexandria. Over one-half of the foreign trade of Greece passes through Piraeus. The manufactures are textiles, leathers, liquors, and macaroni. Population, about 135,000.

**Saloniki,** *sah lo ne' ke* (sometimes spelled SALONICA), a seaport on the Gulf of Saloniki, an arm of the Aegean Sea. It is a picturesque and ancient city, with white houses surrounded by white walls, clustering elms and cypresses, and mulberry trees; with broad streets paved with lava; and with the slender minarets and towers of its mosques piercing the sky line. Its harbor is ample and is protected by a great breakwater, and the city has railroad connections with all Greek cities and with the Balkan states at the north.

The most interesting thing about Saloniki is its turbulent history. Ever since it was founded, in 315 B.C., it has been the scene of successive invasions, conquests, and massacres by hostile peoples, and has been, at one time or another, under the rule of practically every adjacent country and nation. In 904, when it was invaded by the Saracens, 22,000 of its inhabitants were sold into slavery. In 1430, in spite of the most desperate resistance, it was taken for the fourth time by the Turks and was held by them until 1912, when it was recaptured by the Greeks.

As a neutral port and the shipping center for the entire Balkan Peninsula, Saloniki entered on a period of prosperity when it fell to the hands of the Greeks, such as it had never known before. In 1915 the Allies blockaded the port of Saloniki against the Germanic powers. In 1916, after King Constantine had refused to give moral support to the allied cause, Premier Venizelos and his forces set up a provisional government in the city. On the downfall of the king, in June, 1917, this provisional government was merged with the legal government of united Greece, and Saloniki returned to normal conditions.

The business section was destroyed by fire in 1917, but has been rebuilt, and to-day Saloniki is one of the most modern cities of the Near East. Population, about 500,000.

## Physical Features

There is a very special fitness in bringing the discussions of the geography and the history of Greece as near together as possible, for the two are closely related. It is impossible even to imagine what the history of the country would have been had land communication been easier and sea communication been more difficult, but it is certain that it would have been very different.

**Coastal Peculiarities.** The first point that strikes an observer of the map of Greece is the broken character of its coast, and the consequent length of shore line. Gulfs and bays penetrate far into the land, and the southern end of the peninsula, the Peloponnesus (which see), is almost cut off from the northern by the deep gulfs of Corinth and Aegina. Of all the countries of the world, Greece has the largest proportion of coast line to area—nearly 2,500 miles of coast line, or one mile of coast to every ten square miles of surface. Small wonder, then, that the Greeks have been at all times a sea-loving people. Good harbors are not numerous, though there are some excellent ones, notably Piraeus, the seaport of Athens.

**Surface and Rivers.** In the main, Greece is mountainous, even its islands being but the tops of submerged hills. The Pindus Mountains, running from northwest to southeast almost through the center of the peninsula, form the watershed. To the west of these there are north and south chains divided by narrow valleys, but to the east there are east and west ranges between which lie the extensive plains which have played the chief part in Greek history. Macedonia, the plains of Thessaly, those of Thebes, of Athens, of Sparta, and of Messene were the centers of ancient Greek life, the homes of the famous city states. Many of the mountains of Greece have special associations: Olympus was the fabled home of the gods; Parnassus, the haunt of Apollo and the Muses; Hymettus produced honey of rare quality; and Pentelicus was the source of a beautiful marble. But the mountains are worth visiting, aside from their historic associations, for they have a beauty all their own. At places, where the sheer mountain walls rise from the blue sea toward the bluer sky, the grandeur of the scenery is almost unsurpassed.

Greek rivers, too, are beautiful—rushing mountain torrents which are worthy of the legends the old Greeks wove about them; but they are too rapid for navigation, and are for the most part merely temporary, carrying water only during the rainy season, so that they are not available for irrigation. The Achelous, in the northern part, and the Alpheus, in the Peloponnesus, are the rivers of chief importance.

One of the largest lakes, Copais in Boeotia, has had a bad influence, it is believed, on the people who live near its shores. Like their descendants, the Boeotians in ancient times were the slowest-witted of all the Greeks, and scientists now believe that this condition was due to the malaria spread by the mosquitoes which Lake Copais bred. Now that the lake has been drained and converted into farm land, an improvement in the mentality of the modern Boeotians is becoming apparent.

**Industries.** Greece is primarily an agricultural country, and about one-fourth of the land is under cultivation. The farmer is con-

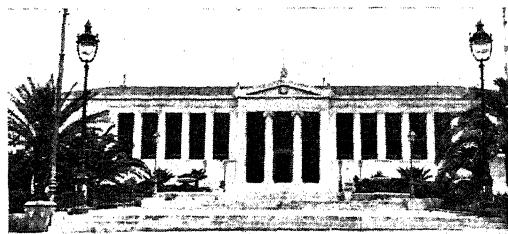


Photo: O R O C

THE UNIVERSITY OF ATHENS

It was erected in 1837, and is adorned with polychrome painting. The columns are Ionic.

fronted with many drawbacks, however, for, while the climate is subtropical and would make possible the growing of many kinds of crops, the soil is thin and the rainfall is very light in the summer months. Because there is more rain in the western mountains than on the eastern plains, the farms are more numerous among the mountains, curious as that may seem. Marshy stretches are being drained and dry places irrigated, and thus the cultivable area is being steadily increased.

**Chief Crops.** The most distinctive crop, as well as one of the most important, is a small, seedless grape, called *currant* because it is most successfully grown in the neighborhood of Corinth. This is not the little tart fruit known in America as the currant, but a true grape, which is either dried or made into wine of an inferior quality. All over Greece is to be seen the dusty gray-green of the olive trees which for so many centuries have been of importance in the life of Greek farmers. So important are they that the Turks, during their domination, could think of no better way of punishing insurrection than by cutting down the olive trees. To-day there are millions of trees in the country, and each tree produces nearly ten pounds of oil annually.

One of the most important crops of Greece is tobacco, for much of the finest cigarette tobacco in the world is grown in that country; it is one of the main exports, especially to the United States. Wheat, too, is one of the chief

crops, but with their primitive methods, the peasants are not able to raise enough to supply the home demand, and the cereal is imported in large quantities. Since vegetables form the staple diet of the people, huge gardens are numerous, and in every grassy place are to be seen herds of sheep and goats, from whose milk cheese is made. Almost no butter is used, olive oil largely taking its place.

**Mining.** Greece is not rich in minerals, and those it has are not easily mined, because of the entire absence of coal. Near Athens there are lead mines of large size, and from the ore considerable silver is taken. Iron, copper, zinc, lead, tin, nickel, and various other minerals also are worked. Heaps of slag show that the ancients worked this field, but it was done so poorly that it has paid modern investors to rework the slag. Most famous of all the mineral products of Greece is the marble from Pentelicus and the island of Paros, which has been known since the great sculptors of antiquity carved their matchless statues.

**Transportation and Commerce.** To the Greeks, the natural means of transportation is the sea, and not the railroads, for few places in the entire country are more than forty miles from the coast. Railroads, therefore, are few, and in the entire country aggregate less than 2,000 miles. But ships are numerous, and by means of them easy communication is maintained with the rest of Europe. It was believed that the canal across the Isthmus of Corinth, completed in 1893, would be a wonderful help to commerce, but it has not been much used, because of its narrowness and the strong currents which flow through it (see CORINTH).

The commerce of Greece amounts to about \$145,000,000 annually. The imports considerably overbalance the exports, and trade with the United States exceeds that with Great

Britain. The excess of imports over exports is balanced by the earnings of the merchant marine, the money sent by emigrants, and the income from the tourist trade.

**Education and Religion.** Greece has a system of schools which includes elementary and intermediate departments and universities. At Athens are the National University, founded in 1836, and the Capodistria University, with nearly 10,000 students. In 1925 a third university was founded at Saloniki. There are also small agricultural schools. Scientific research of all kinds, especially in art, history, and archaeology, is carried on at the National Archaeological Museum, where the United States, Great Britain, France, and Germany are represented. In spite of these institutions, education is by no means widespread, for the people are slow to avail themselves of their opportunities. Conditions are gradually improving. There is a compulsory-education law, but in the country districts it is not well enforced.

The prevailing religion is Greek Orthodox, but complete freedom of worship is allowed. The Holy Synod, which meets at Athens, manages the affairs of the Church (see GREEK CHURCH).

**Government.** The government of Greece, until 1924 a monarchy, became in that year a republic, by vote of the people. After the expulsion of the king, the ambitions of the political chieftains were so conflicting that during the following three years there were eight different governing bodies. A new Constitution, published in 1926, provides for a legislative body of two houses, elected by universal suffrage. The Senate (Upper House) consists of 150 members. A President is elected for a term of five years, by joint vote of the two houses. The Cabinet, headed by the Premier, consists of eleven ministers. No Premier may hold office for longer than one year.

## History of Greece

**Its Beginnings.** The very early history of Greece is shrouded in mists, through which only gradually gleams of light begin to break. The very oldest inhabitants of the soil, who were called by the later Greeks *Pelasgians*, were little by little assimilated by these same later Greeks, or *Hellenes*, as they called themselves, who came in from the north. Marvelous tales of the earliest age of history, the so-called Heroic Age, survive—tales of Hercules and Theseus, of the Argonauts and of Perseus, of Troy and of Thebes (all of which see); and recent excavations at Troy, at Mycenae, and on the island of Crete have made it clear that this ancient time had a very real civilization, long before the Greeks came into the peninsula from the north.

**Greek Middle Age.** About 1200 B.C., as nearly as can be known, there began a period which lay between two ages of culture and prosperity, and thus corresponded roughly to the Medieval Age of later Europe. Its characteristic feature was the so-called Dorian migration, a movement of the rude, primitive tribes of the northern fastnesses of Greece south into the Peloponnesus. Chief of these Dorian tribes were the *Laconians*, or *Spartans*, whose main city developed into one of the two great powers of Greece. Before this sweeping wave of Dorians, some of the tribes already settled in Greece were crowded out, so they crossed the Aegean into Asia Minor, where they founded those colonies which played so large a part in later Greek history. Several cen-



Photos: O H O C

**In Modern Greece.** Illustrations from left to right: Type of peasant; shepherd in national costume (becoming rare); with their sheep on the slope of Mount Parnassus; women of a Macedonian village; ancient well near Mycenae, in use to-day.

turies later there was a new era of colonization, and settlements were made in Sicily and in Southern Italy, those in this latter country being so numerous that the name "Great Greece" (*Magna Graecia*) was applied to the southern part of the peninsula.

That this middle period was in no sense a "Dark Age" must be thoroughly understood. It produced, for one thing, those great epics, the *Iliad* and the *Odyssey* (both described in these volumes), which, by celebrating past glories, helped to rouse in the Greeks a feeling of nationality. Though this was not strong enough to prevent interstate conflict, it drew them together when any outside enemy threatened. It also saw the development from the old tribal form of government, through monarchy and oligarchy toward democracy, though in no state was democracy actually achieved during this period.

*The City State.* During this period there was developed that most typical of all Greek political institutions, the *city state*. The Greek cities were the elements about which the national history centered; contests between Athens, Sparta, Thebes, and the lesser cities fill old Grecian chronicles. They were not, however, such cities as those of the modern world. Each city with its surrounding territory was in effect a nation, very small but entirely self-governing. Its citizens owed allegiance to no other powers, and it might declare war irrespective of the wishes of any neighboring city. There were other differences also. When historic Athens is spoken of, it is not simply the walled town with its Acropolis and wonderful buildings that is meant, but all Attica, with its farms and villages. All the dwellers throughout such a region might have a national pride as Greeks, a sentiment of loyalty toward Greece as a whole, but their intense patriotism was toward the city: they were, for example, Athenians or Spartans first, and then Greeks. This must be understood, that it may be clear why Greece throughout antiquity was never one nation.

*The Period of Glory.* By the close of the sixth century B.C., the powerful city states had developed fully, each in its own field. Sparta was a great military power, Corinth was commercially supreme, and Athens was beginning to be the center of the intellectual and artistic life (see articles on those cities). Great political advance had also been made. Draco had drawn up a code of laws at Athens, and Solon and Clisthenes had broken the rule of the old land-holding nobles and organized the first democratic government of the world. But it was war which brought Greece to the height of its glory—war with a great foreign power.

*The Persian Wars.* The Ionian cities which had been planted in Asia Minor had kept up their connection with the mother country, but

they had come, in 546 B.C., by conquest, under the rule of Persia. So severe was this rule that the cities revolted in 499 B.C., and Athens sent them aid in their unsuccessful insurrection. For this act Darius, the Persian king, decided that Athens must be punished. So determined was he not to let his wrath die down that he commanded a servant to repeat to him three times each day, "Master, remember the Athenians."

In 492 B.C., therefore, Darius dispatched an army into Greece under his son-in-law, Mardonius, but a storm off Mount Athos destroyed the Persian fleet, and the army suffered so severely during its progress through Thrace that the expedition was abandoned. Unappeased, Darius sent out another force two years later, but this army encountered the Athenians on the plain of Marathon (which see) and was overwhelmingly defeated. This victory, one of the "fifteen decisive battles" of the world, gave confidence to the Greeks, and raised Athens to the position of acknowledged headship among the Greek states. See FIFTEEN DECISIVE BATTLES.

Themistocles (which see), realizing that Persia had not yet given up the struggle, persuaded the Athenians to increase their navy, on which he felt Greece must of necessity depend in any future conflict. Events proved his wisdom, for in 480 B.C. Xerxes, the son of Darius, undertook to carry to success his father's project. With a land and naval force which the ancients estimated at more than 2,000,000, but which authorities believe to have included only about 300,000 actual warriors, he crossed the Hellespont and marched through Thrace and Macedonia. Laying aside their jealousy, Sparta and Athens summoned a congress of the states at Corinth, and a number of the cities were represented and agreed to help in the struggle.

In a series of battles which included the heroic, but for the Greeks, disastrous, stand at Thermopylae (which see), the great naval engagement at Salamis (which see), and the battle at Plataea, Xerxes attempted to crush the Greeks, but their heroism and patriotism were in the end triumphant, and the Persian hosts were compelled to withdraw to Asia.

For half a century after the close of the Persian wars, Greece had peace, and the city states had leisure to develop their differing types of civilization (see ATHENS; SPARTA). Because of its naval leadership during the war, Athens was the dominating power in the peninsula, and reached a height at which the world still marvels. Its democratic ideas were widely adopted by the other states, but Sparta held firmly to its old aristocratic government.

*Period of Decline.* The old rivalry between Athens and Sparta, which had been almost forgotten during the Persian wars, flamed up

again when there was no great need for harmony, and in 431 B.C. Sparta found in the relation of Athens to its allied states an occasion for war. In the resulting struggle, known as the *Peloponnesian War*, Pericles, the great Athenian statesman, held his people back from land battles, in which they were no match for the Spartans, but attempted to destroy the commerce of the Peloponnesus and to gain possession of the coast towns and islands. Sparta, in the meantime, did its best to induce the colonies of Athens to revolt, and sent expeditions to ravage Attica. The Athenian plan worked well until a terrible plague broke out in the city and carried off at least a fourth of the population. Pericles was one of the victims, and there was no one who could take his place. For twenty-five years the struggle went on, Athens almost constantly losing ground, but determined not to give up. The expedition to Sicily in 415 B.C. under Alcibiades (which see) and Nicias turned out so disastrously that Sparta thought its victory was won, but the Athenians held out until 404 B.C., when they were compelled to accept the most humiliating terms of peace.

Sparta was now the head of the Grecian states, and it proved such a hard master that at length the other states revolted, under the leadership of Thebes (see EPAMINONDAS). The Spartans were defeated at Leuctra in 371 B.C., and until 362 B.C., when Epaminondas was killed, Thebes was the foremost state in Greece.

**Period of Foreign Rule.** To the north of Greece, a strong ruler, Philip of Macedon, had firmly established his kingdom, and in the disturbed conditions in which the Greek states found themselves, he was able gradually to extend his power southward. Demosthenes at Athens thundered against him in his *Philip-pics*, and at length the Greeks roused themselves to resist the invasions. At Chaeronea, in Boeotia, they were defeated in 338 B.C., and Greece became a part of the Macedonian Empire. The Macedonians were themselves a Hellenic people, and the Greeks were not brought into entire subjection, because their intellectual superiority was clearly recognized by Philip and by his greater son, Alexander the Great.

After the death of Alexander, the Greek states had a troubled existence, struggling constantly but vainly to throw off the yoke of Macedonia, but in 146 B.C. they passed under the rule of another conqueror. With the capture and burning of Corinth in that year, Rome became supreme over the Greek states, and for a time they prospered under a mild and just government. A revolt in 22 B.C. brought down on them the vengeance of Rome, and several of the great cities were practically destroyed. From that destruction they never

entirely recovered, though, under the Roman emperors, Greece regained a certain prosperity and was recognized as an intellectual center. Christianity made rapid progress, and the picturesque paganism gradually died out. New importance came to the province when, in A.D. 330, Constantine the Great moved his capital to the old city of Byzantium, which he rechristened Constantinople (see CONSTANTINE). In 395 the Roman Empire was divided into the Eastern and the Western empires, and Greece was a part of the former until the fall of Constantinople in 1453 (see BYZANTINE EMPIRE) gave the country to the Turks.

Under the Turkish rule, which lasted almost four centuries, the Greeks sank into a pitiable condition, but their devotion to their Church and their interest in the local self-government that was allowed them helped to preserve their feeling of nationality. In the early years of the nineteenth century, this feeling seemed to grow more intense, and in 1821 a war for independence broke out under Alexander Ypsilanti. To check the revolt, the Turks resorted to their usual weapons, massacre and wholesale execution; nor were the Greeks much more humane in their methods. Champions of the determined people sprang up on all sides, the English poet Byron being the most notable, and in 1827 England, Russia, and France gave Greece their open support. The great naval Battle of Navarino, fought on October 20, 1827, resulted in the complete defeat of the Turkish fleet, and Greece became an independent kingdom.

**The Modern Kingdom.** In 1832 Otto of Bavaria was made king, and while his rule was far from despotic, the Greeks were much disappointed because he did not proclaim a constitution, as they had expected him to do. He was forced in 1843 to yield to the strong popular demand, and a constitution went into effect the next year. This did not lessen Otto's unpopularity, however, and in 1862 he was compelled to abdicate, largely because he had not taken an active part in the Crimean War and won for Greece an increase in territory. Prince George of Denmark was chosen by the national assembly as king, and in 1863 he began his reign, which continued for half a century. In 1864 England gave up to Greece the Ionian Islands, and after the Congress of Berlin in 1878, the country was further enlarged by the accession of Thessaly.

In January, 1897, Greece went to the aid of the Christians in Crete, who were rebelling against Turkish rule and seeking annexation to Greece, and the result was complete defeat for the Greeks. They were compelled to pay a huge indemnity to Turkey, and to give up their claims on Crete, which did not come under the Greek flag until 1913, after the Balkan Wars. This struggle broke out in 1912

## OUTLINE AND QUESTIONS ON GREECE

### Outline

#### I. Location and Size

- (1) Easternmost of European peninsulas
- (2) Surrounding waters and islands
- (3) Size after 1913—50,000 square miles

#### II. Physical Features

- (1) Coast line
  - (a) Longest in proportion to area of any country
- (2) Surface characteristics
  - (a) Largely mountainous
    - i. Effects of this fact on history
- (3) Waters
  - (a) Turbulent character of rivers
  - (b) Malarial lake of Boeotia

#### III. Ancient Greece

- (1) Lack of national unity
  - (a) Effect of geography in this
- (2) The people
  - (a) Four tribes
  - (b) Love for beauty
    - i. Great works of art
  - (c) Religion or mythology
  - (d) Education
    - i. Athenian standard
    - 2. Spartan standard
  - (e) Slavery

#### IV. Modern Greece

- (1) The people
  - (a) Change for the worse during years of subjection
  - (b) Opposite change since independence
- (2) Industries
  - (a) Agriculture
    - i. Currant and olive
    - 2. Tobacco
    - 3. Wheat
  - (b) Mining
  - (c) Home manufactures
  - (3) Transportation and commerce
  - (4) Religion, education, and government

#### V. History

- (1) Early periods of migration
- (2) The wonderful years
  - (a) Persian wars
- (3) Downfall of Athens
  - (a) Peloponnesian War
- (4) Subjection to foreign powers
  - (a) Macedonia
  - (b) Rome
  - (c) Turkey
- (5) The modern kingdom
  - (a) Independence secured in 1827
  - (b) Activities of the nineteenth century
  - (c) Balkan Wars
  - (d) World War
  - (e) Later events

### Questions

Name an ancient Greek slave who became famous. How did he gain his fame? What geographic cause accounted for the stupidity of one group of the people? What helped the people to preserve a feeling of nationality during the centuries of Turkish domination?

How did the Spartan ideal in education differ from the Athenian?

If the coast line of the United States were as long in proportion to area as that of Greece, how long would it be?

Why would the proverb "Handsome is as handsome does" have seemed foolish to an ancient Athenian?

Why has not the Corinth Canal been as great an aid to commerce as it was expected to be?

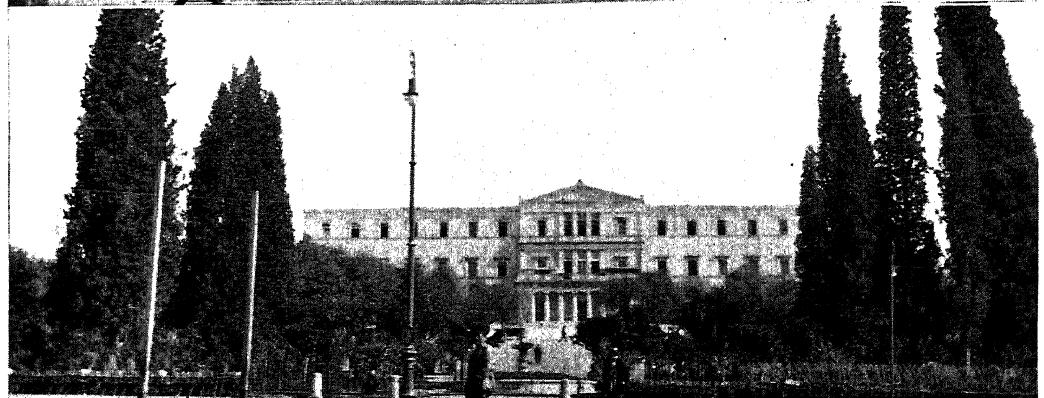
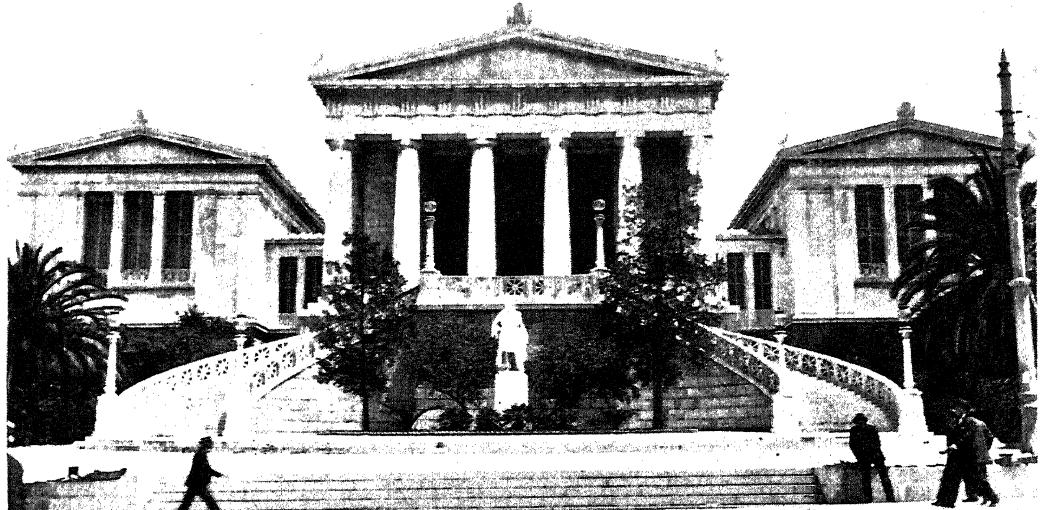
Why does the word *Thermopylae* stir the blood of a Greek?

What did the Greeks call all non-Greeks? What did the word mean?

Why does it seem unlikely that the manufactures will ever increase in importance?

Who took as his watchword "Remember the Athenians," and what did it mean?

How did the geographic conditions tend to make of ancient Greece many small countries instead of one large one?



Photos: O R O C

**Architecture in Athens.** Library, made from Pentelic marble. The Royal Palace, now the Presidential Palace. The great Stadium, as it appears to-day, mostly rebuilt.

between Turkey and the Balkan states, and Greece profited largely by the success of the latter, gaining not only Crete but many other islands in the Aegean which had been a part of historic Greece, and much of Macedonia besides. The cost was great, both in money and in men, and the exhaustion which resulted had much to do with the attitude of Greece during the World War.

On March 18, 1913, while on a tour of inspection, King George was assassinated at Saloniki, and his son, Constantine I, came to the throne. The country was confronted with a serious problem on the outbreak of the World War in 1914, but declared at once its absolute neutrality.

The position of Greece in connection with the war was exceedingly embarrassing. The queen was a sister of the German emperor; the royal family therefore leaned strongly toward the cause of the central empires, Germany and Austria. The majority of the people were in sympathy with the Entente Allies; this was but natural, because France and England had by treaty guaranteed protection to Greece against foreign invasion.

When Serbia was overwhelmed by the Teutonic forces in 1916, that unhappy little country looked to Greece for support, for after the Balkan Wars the latter had pledged its military strength to support the former against alien enemies. However, Greece ignored the plight of Serbia, and there were strong indications that King Constantine would resist no pressure that Germany might bring to bear upon him.

The military forces of the Entente, by right assumed because of treaty obligations, took extreme measures to insure the continued neutrality of Greece. Men were landed from warships, and allied vessels blockaded the coasts. Constantine was commanded to demobilize his army, as a guaranty that neutrality would be preserved. He failed to keep promises made, and on June 12, 1917, the Allies deposed him, for at least the duration of the war. His second son, Alexander, was made king, and Venizelos, a pro-Ally statesman, formed a new ministry. On June 30 Greece severed diplomatic relations with Germany, and entered the World War on the side of the Allies. In 1918 Greek soldiers fought to good advantage on the southeastern front.

By the treaty of Sèvres (later repudiated), signed in 1920, Greece received considerable territory in the vicinity of Constantinople, as well as a number of Aegean islands. This defiance of Turkey was to have grave results. When Venizelos returned home from the Peace Conference, in the late summer of 1920, he found a people weary of war and restive under post-war conditions. The death of Alexander, in October, was followed by a general election

in which the party of Venizelos was badly defeated. In December, King Constantine returned from exile and was triumphantly reinstated, having received an overwhelming vote.

The Allies thereupon withdrew their financial support of the government, and the following spring, when the Allied Council prepared to revise the Treaty of Sèvres, Greece began war on Turkey, to protect its territorial gains in Asia Minor. The brief war that followed was disastrous to the Greeks, who were compelled to relinquish Eastern Thrace, Smyrna, and the Dodecanese Islands in the Aegean. Confusion reigned at home, and in September, 1923, Constantine was forced to abdicate. He was succeeded by his son, George II, who, however, was allowed to reign only until December, 1923. In 1924 the people voted for a republican form of government, which has endured in spite of a revolution in 1925, in which General Pangalos made himself dictator, displacing Kondirotis. In August, 1926, Pangalos was overthrown, and Admiral Kondirotis resumed his office of Provisional President. In 1928 Venizelos was returned to power as Premier, by a large vote, Kondirotis continuing as President.

C.S.

**Related Subjects.** The following articles in these volumes will throw much light on the history and life of Greece. The articles on ARCHITECTURE and SCULPTURE should also be consulted. For the literary references relating to the country, see DRAMA, POETRY, etc.

## CITIES AND TOWNS

|          |         |
|----------|---------|
| Athens   | Mycenae |
| Corinth  | Sparta  |
| Delphi   | Thebes  |
| Marathon |         |

## DIVISIONS

|         |              |
|---------|--------------|
| Arcadia | Macedonia    |
| Attica  | Messenia     |
| Boeotia | Peloponnesus |
| Epirus  | Thessaly     |
| Laconia | Thrace       |

## HISTORY

|                     |                        |
|---------------------|------------------------|
| Actium              | George I               |
| Alcibiades          | Helots                 |
| Alexander the Great | Hipparchus             |
| Arbela              | Leonidas               |
| Archon              | Lysander               |
| Aristides           | Miltiades              |
| Balkan Wars         | Nicias                 |
| Bozzaris, Marco     | Oracles                |
| Byron, George N.    | Ostracism              |
| Byzantine Empire    | Otto I                 |
| Cimon               | Pelopidas              |
| City States         | Pericles               |
| Civilization        | Phocion                |
| Clisthenes          | Pyrrhus                |
| Codrus              | Solon                  |
| Constantine I       | Themistocles           |
| Darius              | Thirty Tyrants         |
| Demosthenes         | Troy                   |
| Dorians             | Venizelos, Eleutherios |
| Draco               | World War              |
| Epaminondas         | Xerxes                 |

## ISLANDS

|          |                |
|----------|----------------|
| Crete    | Ionian Islands |
| Cyclades | Ithaca         |
| Delos    | Melos          |
| Euboea   | Salamis        |

| PEOPLES           |                |
|-------------------|----------------|
| Achaeans          | Dorians        |
| Aeolians          | Ionians        |
| PHYSICAL FEATURES |                |
| Acheron           | Olympia        |
| Aganippe          | Olympus        |
| Helicon           | Parnassus      |
| Mars Hill         | Thermopylae    |
| UNCLASSIFIED      |                |
| Acropolis         | Mysteries      |
| Areopagus         | Mythology      |
| Festivals         | Nemean Games   |
| Greek Literature  | Olympian Games |
| Isthmian Games    | Pythian Games  |
| Laurel            | Stadium        |

**GREEK CHURCH**, the name commonly used for the religious organization whose proper title is Holy Orthodox Catholic and Apostolic Church. It is sometimes called *Eastern Church* to distinguish it from the *Western*, or *Roman Catholic*, Church. Unlike the Roman Catholic organization, the Greek Church is an oligarchy of several patriarchs, instead of being governed by a single Pope. The seven rites of the Roman Church are observed, namely, Baptism, Confirmation, the Eucharist, Penance, Extreme Unction, Holy Orders, and Matrimony, but there are variations from Roman practices. The crucifix is the one graven image permitted, though the veneration of pictures is allowed. Celibacy is obligatory for bishops, but priests and deacons may marry once. Singing is allowed only by male voices in church services, and the ceremonial is exceedingly formal.

The estrangement and separation of the Greek and the Roman Catholic Churches had its beginning in the political division of the Roman Empire and the founding of Constantinople; but it was not until the ninth century that the "great schism," or splitting of the Church into factions, began. Photius, who succeeded Ignatius as patriarch, called a synod in Constantinople in 867, and ruled that the Bishop of Rome, by that time called the Pope, should not be supreme, and denounced as heresy the insertion in the Nicene Creed of the word *filioque*, meaning *and from the Son*. He also denounced the prohibition of priestly marriage. After his death in 891, the churches were reunited until the eleventh century. The final division was that between Pope Leo IX and Patriarch Cerularius in 1054. Since that time, the Roman Catholics have regarded adherents of the Orthodox Greek Church as outside the Roman Catholic Church, while the Greeks maintain they have been faithful to the usages and creed of the Roman Church.

Originally, the Greek Church comprised three main divisions; namely, the Church in Greece, the Church in the Turkish Empire, and the Russo-Greek Church. Since the World War, many changes have occurred. At the outbreak of the war, Russia had about 100,000,000 Slavonic Orthodox Church members. The

Orthodox Church in Turkey, under the Ecumenical Patriarch (the Archbishop of Constantinople), had a membership of 2,500,000 in Europe, and 2,000,000 in Asia Minor and the islands. There were about 2,000,000 Greek Orthodox adherents in Greece itself, and numerous Orthodox worshipers in Serbia, Bosnia-Herzegovina, Bulgaria, Rumania, and other sections of the Balkan region and Austria-Hungary.

In Russia proper, as constituted since the Treaty of Versailles, the Orthodox Church has received a severe setback, because of the opposition of the Soviet government to religious education and practice. Most of the bishops went into voluntary exile or were interned in monasteries, and the only ruling body that functions is a synod of fifteen Russian bishops, which holds sessions at Belgrade, Serbia. The peasantry, however, has largely remained true to the faith of its fathers.

When Turkey reorganized its government and abolished the sultanate, an attempt was made to abolish the Ecumenical Patriarchate, but this measure was prevented by the European powers. By the Treaty of Lausanne, Greek Orthodox residents in Constantinople are exempt from expulsion, but other Greeks in Turkey have suffered much from the hostility of the Turkish régime. The Orthodox Patriarchate of Jerusalem, with 30,000 adherents, is under British mandate; and that of Antioch, with 300,000 members, is under French. There is also a Patriarch of Alexandria, who has jurisdiction over a membership of about 100,000.

In Greece itself, the Greek Orthodox Church is the state religion, and most of the Greek population are adherents of that body. Church government is vested in the Holy Synod, consisting of the Metropolitan of Athens as president, and four archbishops and bishops. During their year of office, these latter reside in Athens. Theoretically, the Ecumenical Patriarch in Constantinople has jurisdiction over Macedonia, Western Thrace, Epirus, Crete, and the Aegean Islands. In Yugoslavia, which has a considerable Roman Catholic population, the Greek Church has been reorganized, and now includes the former Orthodox churches of Serbia, Dalmatia, Bosnia-Herzegovina, and Montenegro. There is no State Church, because there is no dominant religious body in the kingdom. In Rumania, the United Orthodox Church, representing a union of the churches of Rumania, Transylvania, Bukowina, and Bessarabia, has about 11,000,000 adherents.

A Greek Church in England has existed since the seventeenth century; its present plan of organization is similar to that in Russia. In the United States, both the Greek and the Russian branches of the Orthodox Church are

represented, with a membership of over 125,000 and with more than 400 churches.

The total membership of the Greek Orthodox Church and its branches probably exceeds 125,000,000, with 90,000,000 or more in Russia.

B.M.W.

[The Greek Catholic Church is an organization which is Greek in origin, but which owes allegiance to the Roman Catholic Pope. Its deacons are permitted to marry.]

#### GREEK CROSS. See CROSS.

**GREEK FIRE**, a chemical mixture which, when touched by water, would burst into flames that could hardly be extinguished. It was employed by the Byzantine Greeks of the Middle Ages to set fire to enemy fleets and to repel the besiegers of Constantinople, and was used by being forced through tubes in a stream of living fire, thrown from ladles, or poured from caldrons. Its composition was a secret, and modern chemists can only surmise what substances formed it. One theory is that quicklime was added to some of the incendiary compounds, of which the principal ingredients had been known before the Christian Era. Sulphur, pitch, charcoal, naphtha or petroleum, tallow, rosin, and turpentine were among the materials of the earlier mixtures, generally known as *wildfire* and erroneously called Greek fire by the Crusaders, though lacking the qualities of the dreaded Byzantine flame. Saltpeter was added to wildfire, and perhaps to Greek fire, in the thirteenth century, so that they differed only slightly from gunpowder, then unknown.

T.B.J.

**Liquid Fire**, a German device in the World War, resembling Greek fire mainly in its effects, is described in its proper place in these volumes.

#### GREEK FOOT. See FOOT (measure).

**GREEK GODS.** See MYTHOLOGY; GODS OF GREECE AND ROME.

**GREEK LANGUAGE**, a branch of the Indo-European family of languages, akin to Sanskrit and Latin and to the languages of the Teutonic races. In its classic form, it is considered to have been the most beautiful and perfect language ever spoken, not only by reason of its musical character, but because the large number of word forms made possible a precision in expression not to be had in any less inflected speech. For instance, in the classic Greek a fully conjugated verb possessed 507 different forms.

**Ancient Greek.** The geography of Greece influenced not only the history of the country but its language as well. The mountains which cut off one little group or region from another were barriers to the growth of a common language, and thus a number of dialects were in use in Greece before the dawn of the historic period. These seem never to have been so distinct, however, that inhabitants of one

region could not understand those of another. The dialects of historic times are usually grouped under three main divisions—Doric, Aeolic, and Ionic, this latter including Attic. The two former were more harsh and uncultivated than the Ionic, which with the Attic was the chief literary language. The poems of Homer are the oldest writings in the Ionic dialect, but Homer's language was never a vernacular—the speech of one locality; it was always a purely literary language. Later, the greatest of Greek writers, Aeschylus, Sophocles, Euripides, Xenophon, Plato, used the Attic dialect, and this has been adopted by scholars as the standard of the ancient and classic Greek.

Still later, there arose a slightly modified Attic, known as the "common dialect," which the conquest of Alexander the Great made widely prevalent. Plutarch and Lucian used this form, and the New Testament was written in it.

All the alphabets of modern Europe may be traced back to the Greek alphabet (see ALPHABET), which was in its turn derived from the Phoenician. Just when it was introduced is not known, but there are inscriptions which date from the seventh century B.C. The alphabet consists of twenty-four letters, with consonants pronounced as in English, but vowel sounds more closely resembling German. Accents in Greek indicated voice pitch, and not stress, as in English. Originally, Greek writing, like the Phoenician, was from right to left; later the direction alternated, "as an ox plows," but from 500 B.C. a uniform direction from left to right was followed.

**Modern Greek.** The modern period of the Greek language is generally considered to have begun about A.D. 800. Considering the fact that the changes which differentiate modern Greek from the old "common dialect" have been over a thousand years in the making, they are not extreme.

Modern Greek is much like classic Greek, in spite of considerable change in pronunciation and loss of many inflections. Many words have been added from other languages, but since modern Greece has become an independent nation, its writers have united in an effort to return to the vocabulary of classic Greek.

**As a Study in Schools.** About 1550, no less famous a person than Rabelais wrote to a friend that Greek was "that without which it is a disgrace for a man to style himself scholar." Formerly, both in Europe and America, a man had to know Greek in order to be well educated. Many European universities continue to emphasize Greek, but the trend from classical studies to technical and specialized study, and the growth of the elective system, have caused Greek to lose its position as a necessary part of education in the United States. Although it is still studied in some colleges, and even



Photo: Foster Bros.

AUTOMEDON WITH THE HORSES OF ACHILLES, PORTRAYING AN INCIDENT IN GREEK LITERATURE  
[From the painting by Regnault (1843-1871), now in the Art Museum, Boston.]

in preparatory schools, few colleges require it for admission or graduation. It is still considered an essential part of preparation for the ministry.

The masterpieces of literature that are open to a student of Greek are discussed in the article GREEK LITERATURE.

**Words Derived from the Greek.** Modern English, as well as French, Spanish, and other languages, contains many words of Greek origin. It is true that most of the Greek words in English are less frequently used than the Anglo-Saxon or even the Latin words. But in the arts and sciences, the technical words are nearly all Greek or Latin, the Latin words, in turn, being frequently derived from the more ancient Greek. Such words as architect, arithmetic, astronomy, dynamo, electricity, grammar, geography, geometry, orator, politics, photograph, prophet, rhetoric, and telegraph, are all Greek in origin.

**GREEK LETTER SOCIETIES.** See FRATERNITY.

**GREEK LITERATURE.** Though written in what is known as a "dead language," because in its old form it is spoken by no nation in the present age, the literature of ancient Greece is alive as truly as are the writings of to-day, and it is far more influential than most of them. In every country and every age, writers have found in it inspiration and guidance, and in certain departments its productions have never been surpassed. Though less stress is laid on the teaching of Greek literature in schools and colleges now than a generation or two ago, some knowledge of its great masterpieces is necessary to a liberal education, and the person who cannot understand an allusion to the *Iliad* or the *Odyssey* is likely to find himself seriously handicapped in reading many modern works. In such a brief treatment as this must be, it is more satisfactory to divide

Greek literature into its various branches than to attempt chronological grouping.

**Poetry.** The Greeks developed almost every variety of poetry to a high point of excellence. Sappho, Anacreon, and Pindar wrote lyrics, exquisitely rhythmic poems which were supposed to be sung or chanted to the music of the lyre; and some of their forms and meters modern poets have found well worth imitating. Didactic poetry began with Hesiod, and has seldom if ever risen above his level—for this is not one of the highest types of verse. The great glory of Greece, however, was in its epics and dramas. It is really difficult to imagine what subsequent literature would have had there been no *Iliad*. Vergil's *Aeneid*, Dante's *Inferno*, Milton's *Paradise Lost*, and Longfellow's *Evangeline*, to mention merely the most outstanding examples, are inestimably indebted to it, as are countless shorter poems. If it had called into being but one poem, Keats' *On First Looking into Chapman's Homer*, with its haunting description of the men who—

Look'd at each other with a wild surmise,  
Silent upon a peak in Darien,

English literature would owe it a very real debt.

In the field of drama, both comedy and tragedy were brought to perfection (see DRAMA). Aristophanes was a master of humor and satire, while Aeschylus, Sophocles, and Euripides produced tragedies which, in beauty, strength, and passion, still rank among the greatest in the world. Even in translation, these masterpieces have a depth and dignity possessed by few more modern works.

**Prose.** To many a modern reader, the word *prose* suggests, first of all, fiction. Of this form of literature the Greeks knew nothing, or next to nothing. Their myths were tales full of interest and charm, as many modern children can testify, and they had an occasional legend which they delighted in working up, but of stories, in the sense in which they are known to-day, there were none. But other forms of prose reached a high level. To Herodotus, the "Father of History," and to Thucydides and Xenophon, modern historians have looked, not only for much of their ancient material, but for inspiration and for suggestions as to manner. Plato and Aristotle produced philosophic writings

which were the world's textbooks for centuries, and no modern philosopher is unaffected by them; while Greek orators, notably Demosthenes, left practically nothing for later orators to achieve.

Later, when Alexandria in Egypt became the center of Greek culture, prose and poetry of many forms were produced, but much of it was of a quality inferior to that of the earlier periods. The great Alexandrian Library (see ALEXANDRIA) was a spur to writers, and history, scientific treatises, epics, lyrics, and philosophic works were poured forth. Euclid, Archimedes, Josephus, Plutarch, and

Ptolemy flourished in this period, but of most of these it may be said that it is the content, rather than the form, of their writings which makes them valuable, and that in a measure shuts them out of the province of fine literature.

**Related Subjects.** In these volumes there are articles on most of the Greek writers named above, and a comprehensive view of Greek literature may be gained by reading them in connection with this article. See, also, DRAMA; HISTORY; POETRY, with biographical indexes.

**GREEK SCULPTURE.** See SCULPTURE.

**GREELEY, Colo.** See COLORADO (back of map).

**GREELEY, HORACE** (1811-1872), America's most famous journalist, the founder and first editor of the New York *Tribune*, and the most influential of that famous group of American editors who represented the "old school" of journalism. His position as a molder of public opinion, especially during the last two decades before the War of Secession, is fittingly summarized in Whittier's characterization of him—"our later Franklin."

Horace Greeley was born in Amherst, N. H., was reared in poverty, and received only a common-school education. When a lad of



From the painting by Burne-Jones  
CIRCE, A CHARACTER IN GREEK LITERATURE AND MYTHOLOGY

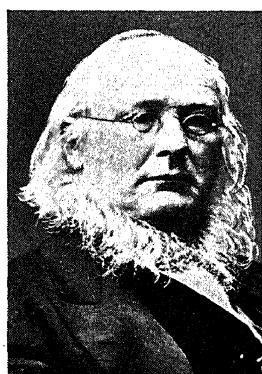


Photo: Brown Bros.

HORACE GREELEY

fifteen he became an apprentice in a newspaper office in Vermont, learning there his first lessons in the profession that was destined to bring him into national prominence.

In 1831 Greeley appeared in New York City, with ten dollars in his pocket and a bundle of clothes swung over his shoulder. After supporting himself for two years by work in various printing offices, he founded, with two friends, the *Morning Post*, the first two-cent daily ever published. It was a financial failure, running only three weeks after January 1, 1833. In March, 1834, its successor, *The New Yorker*, appeared; this was a weekly literary newspaper that enjoyed wide popularity during its seven years of existence.

In 1840 Greeley began the publication of *The Log Cabin*, a weekly campaign paper that gave brilliant support to the candidacy of William Henry Harrison, the Whig nominee for the Presidency. The following year this paper was merged with *The New Yorker* into the *Weekly Tribune*, a periodical which had readers throughout the northern half of the Union from Maine to Oregon, and which wielded an influence unapproached by any other paper up to that time. Through its columns Greeley opposed the extension of slavery, and because people believed in him, he became a mighty force in strengthening the anti-slavery sentiment throughout the North. In April, 1841, he issued the first copies of the *Daily Tribune*, which is still published in New York City. In this paper he vigorously preached the doctrines of the protective tariff and anti-liquor legislation.

Greeley's commanding position in journalism made him a prominent figure in national politics. He was one of the founders of the Republican party and a delegate to its second national convention, where he used his influence to secure the nomination of Lincoln. While he was a loyal supporter of the President during the war, he was willing to end the struggle by compromise, and in 1864 went to Canada to confer with several Confederate agents on the subject of peace, but the effort was fruitless. When the war was over, he urged the granting of a universal pardon to those who had taken part in it, and was one of the signers of the bail bond of Jefferson Davis, the Confederacy's imprisoned President.

Greeley's interest in politics continued until his death. He was a severe critic of President Grant's administration, and in 1872 was nominated by the Liberal Republicans (see POLITICAL PARTIES) for the Presidency. The Democratic party, which adopted the platform of the Liberal Republicans, made him its candidate as well, but in the election Grant won a decisive victory. Worn out by the excitement and suspense of a strenuous campaign, and crushed by the death of his wife,

Greeley became seriously ill soon after the election, and died on November 29, 1872. His funeral was attended by men of national eminence, including the President and Vice-President of the United States.

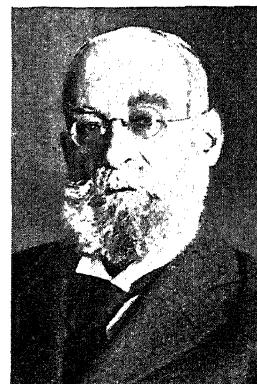
**Books from His Pen.** Greeley was well known as a lecturer and writer, and he traveled widely in Europe and in America. His publications include *Hints Toward Reforms*, *Glances at Europe*, *Overland Journey to San Francisco*, *The American Conflict*, and *Recollections of a Busy Life*.

**GREELY, ADOLPHUS WASHINGTON** (1844- ), an American soldier and scientist, whose chief claim to fame lies in his valiant service in Arctic exploration. He was born at Newburyport, Mass. At the close of the War of Secession, in which he served, he was appointed a lieutenant in the regular army and was attached to the signal service. In 1881 he commanded the expedition sent out by the United States government to establish observation stations toward the North Pole, and made many valuable scientific observations and discoveries. A detachment of his expedition reached

83° 24' N., a higher latitude than had been before attained, taking from England an honor held for three centuries. The non-arrival of relief ships compelled Greely to move southward in 1883, and after losing eighteen of his twenty-five men, he was rescued at Cape Sabine by Captain Winfield Schley, afterward prominent in the Spanish-American War. See POLAR EXPLORATION.

Greely was appointed chief signal officer of the army by President Grover Cleveland in 1887, and was head of the Weather Bureau from that year until it passed under the control of the Department of Agriculture. During the Spanish-American War he was in charge of cable censorship. In 1906, with the rank of major general, he was in command at San Francisco after the fire, and in 1907 he quelled without bloodshed a Ute Indian disturbance in Wyoming. In 1908 he reached the age limit for active service and was retired.

**GREEN**, one of the colors of the solar spectrum, appearing between blue and yellow. Green is one of the most common colors in nature; the grass and nearly all foliage is green. We speak of "green sea water," and in the mineral kingdom we find green in malachite and in the emerald. Many tropical birds have beautiful green plumage, and the wings



ADOLPHUS W. GREELEY

of some species of South American butterflies are gaudy with hues of this same color. Green is the national color of Ireland, and in the past, Lincoln green was worn as a mark of distinction by the Scottish Highlanders. Green is worn on Saint Patrick's Day, March 17. It is the sacred color of the Mohammedans, who carry the green flag, and the background of whose prayer rugs is always green, let the design worked into the fabric be what it may. Traditionally, green is the color of repentance.

Green pigment can be made by mixing blue and yellow pigments, but most of the green paints and dyes, such as Paris green, emerald green, and imperial green, are made by boiling copper acetate in a solution of a compound of arsenic and oxygen. Such paints and dyes are deadly poisons, and they should be handled with care and always be kept out of the reach of children. Most of the green dyes formerly made from vegetable compounds are now derived from coal tar. The numerous tints and hues are formed by mixing the pigments in varying proportions. Most green pigments fade quickly when exposed to the sun. See colored chart, in article COLOR. A.L.F.

**Another Application.** Because green is the color of growing and immature plants, the term is occasionally applied to persons. When so used, *green* means lacking in knowledge and experience. The city boy says the country boy is *green* because he does not know city ways, but when the city boy visits his country cousin, he is just as *green* on the farm as the cousin is on the streets of a great city.

**GREEN, ANNA KATHARINE.** See ROHLFS, ANNA KATHARINE GREEN.

**GREEN, HETTY HOWLAND ROBINSON** (1835-1916), an American financier, at the time of her death the richest woman in America. She was born at New Bedford Mass., and was educated at Mrs. Lowell's school in Boston. In 1865 her father died, leaving her a large fortune, and two years later she married Edward H. Green of New York, who died in 1902. Though she was accounted to be the world's greatest woman financier, her manner of living was simple in the extreme. There was scarcely a colossal corporation or business enterprise of great importance anywhere in the world in her day in which she did not have an interest, and her real-estate holdings in Chicago, New York, and other cities were enormous. Her business,

as well as her property, always remained under her personal management.

**GREEN, JOHN RICHARD** (1837-1883), an English historian, was born at Oxford and graduated from Magdalen College, Oxford, in 1859. His first important historical work, *A Short History of the English People*, while not absolutely authentic in detail, presents a vivid panorama of the past, and is the basis of his enduring fame. Its publication met with immediate success, and it was later expanded into his great *History of the English People*. His second book, *The Making of England*, was a more scholarly, but less popular, piece of work. This was followed by *Stray Studies in England and Italy*, a collection of essays. Green's *Conquest of England* was published by his widow after his death.

**GREENAWAY, KATE** (1846-1901), an English illustrator of books for children, famous throughout the world, and appreciated by young and old for the quaint charm, simplicity, and delicate humor of her sketches. Her subjects are mainly flowers and landscape. She also wrote verses to accompany her drawings. John Ruskin and leading art critics everywhere have praised highly the writing of this talented lover of children.



Photo: Brown Bros.

KATE GREENAWAY

Among her most successful books are *Under the Window*, *A Painting Book of Kate Greenaway*, *Mother Goose*, *Language of Flowers*, and *Kate Greenaway's Almanacs*.



Photo: Brown Bros.

HETTY GREEN

**GREENBACK PARTY.** As a result of an excessive issue of greenbacks by the government of the United States during the War of Secession and in the years immediately following, money was "cheap," and prices were correspondingly high. Agricultural products and manufactured articles sold for more than for years previously, and it was urged that this was due to the plentiful supply of greenbacks; the opinion was doubtless strengthened by the fact that payment was nearly always made in that form of money. A close money market resulted from the panic of 1873, and the advocates of "cheap money" believed that a new issue of greenbacks would restore prosperity, especially to the farmers. Money which could be issued in unlimited quantities, and which could be used in payment of all debts, seemed a cure for every financial evil.

A national political organization was formed by those favoring unlimited use of this paper currency, and naturally it was called the

Greenback party. The Greenbackers' platform demanded that all bank currency be withdrawn from circulation; that henceforth no currency should be circulated except government paper (greenbacks), "based on the faith and resources of the nation" (which meant fiat money); and that gold and silver should be used in payment of interest and principal on government bonds only where it was promised. The party held a national convention in 1876 and placed a Presidential candidate, Peter Cooper, in the field; it polled nearly 82,000 votes, but secured no electoral votes. It then lost its identity. See POLITICAL PARTIES; MONEY (Fiat Money).

**GREENBACKS**, the paper money of the United States government, not including the gold and silver certificates, known as *treasury notes*. Greenbacks, so called because of their color, were first issued in 1862, to finance war operations. Until 1879 they were merely promises of the United States to pay, and were unsecured by metal money; at one time, when confidence in the government was slight, they were worth only thirty-five cents for each dollar. Since then, their issue has been fixed at about \$382,000,000, the amount in circulation at the time, and the government does not guarantee their redemption in gold. See SPECIE PAYMENT, RESUMPTION OF; MONEY.

**GREEN BAY**, WIS. See WISCONSIN (back of map).

**GREEN BRIER**, a North American vine of the lily family, having a prickly stem, bluish-black berries, and broad, short-pointed leaves. The green brier, also called *horse brier* and *cat brier*, is found in moist thickets north to Nova Scotia and west and south to Texas. In landscaping, it is sometimes used to cover fences and summer houses. Its botanical name is *Smilax rotundifolia*. See SMILAX. B.M.D.

**GREENE, NATHANAEL** (1742-1786), a general of the Revolutionary War, known as "the man who saved the South," was born at Pato-womut, R. I. During his early boyhood days he lived the quiet life of the Friends, as his father was a prominent Quaker. When the Revolutionary War clouds gathered, he turned his attention to colonial defense. A slight limp in his walk was first thought to unfit him for hard service, but he rose quickly from the ranks of the "Kentish Guards" and was chosen brigadier general. When news of Bunker Hill reached Rhode Island, his regiment marched to Boston; when Washington took command, he discovered Greene to be a valuable officer and made him a major general.

After the British were defeated in the North, in 1776 and 1777, they turned their attention to the South and captured Savannah. Greene succeeded General Gates in 1780 in command of the Army of the South, which had been so often defeated that it was known as "only the

shadow of an army"; Daniel Morgan and "Light-horse Harry" Lee were sent to his aid, and at Cowpens he defeated the British general, Tarleton. One after another, the British forts were captured in South Carolina. This great soldier, who endured so many hardships in war, was counted, next to Washington, the greatest general of the Revolution. See REVOLUTIONARY WAR IN AMERICA.

#### **GREEN-EYED MONSTER**

**MONSTER**, a term employed by Shakespeare to indicate jealousy. It was formerly believed that a greenish pallor indicated jealousy, and this belief may have given rise to this term. It is said that green-eyed animals such as cats, tigers, and lions play with their meat or prey, seeming to mock at, to loathe, and yet to love the object of their desire. This is a trait supposed to be possessed by those who are jealous.

**GREENFIELD, MASS.** See MASSACHUSETTS (back of map).

#### **GREEN FLY. See APHIDES.**

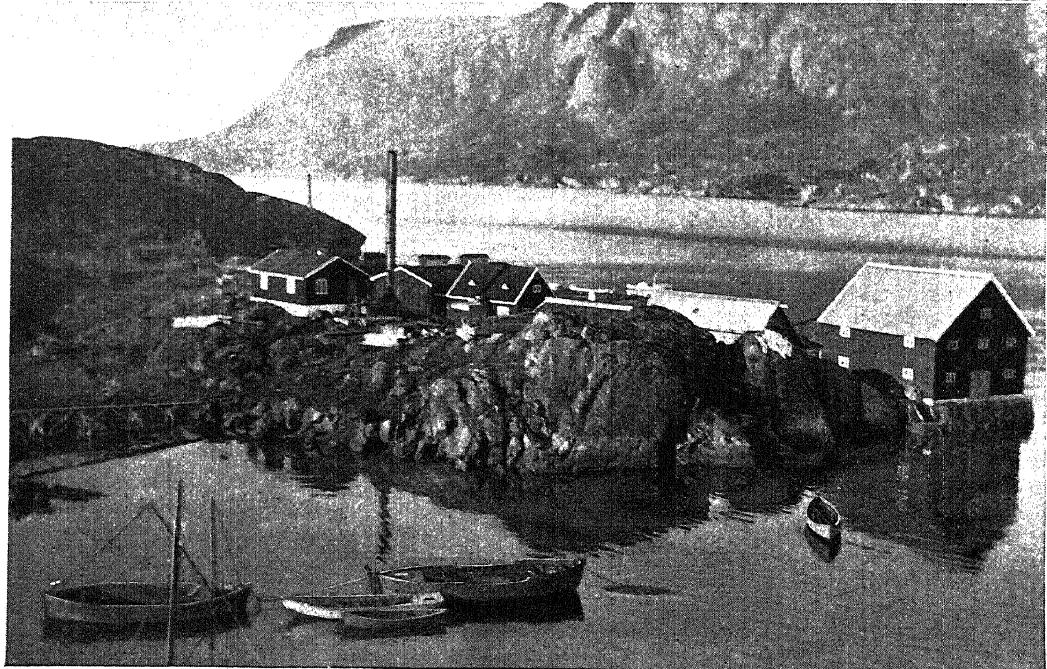
**GREENHOUSE**, a house of glass on a framework of wood, or iron and wood, used for the protection or growth of delicate plants and of plants grown out of season. Such a building must have plenty of light, and is almost invariably glass-covered. When the heat is not sufficient for the tender plants, artificial heat is supplied. Small structures are heated with stoves, but the largest have coils of pipes carrying steam or hot water. A series of greenhouses, clustered together and heated from a central plant, may cover several acres.

A greenhouse used for the display of flowers, rather than their growth, is known as a conservatory (which see). Other places called greenhouses are orchard houses, warm houses, bark stove houses, graperies, etc., and those two commercially important houses, forcing houses and hothouses. In the latter are grown many out-of-season luxuries—vegetables, fruits, and flowers, which command unusually high prices. See HORTICULTURE.

**GREENLAND**, an island belonging to Denmark (and its sole colonial possession), lying almost entirely within the Arctic Circle, to the northeast of the mainland of North America. Next to Australia, it is the largest island in the world. That is one of its chief distinctions; another is that ice covers more

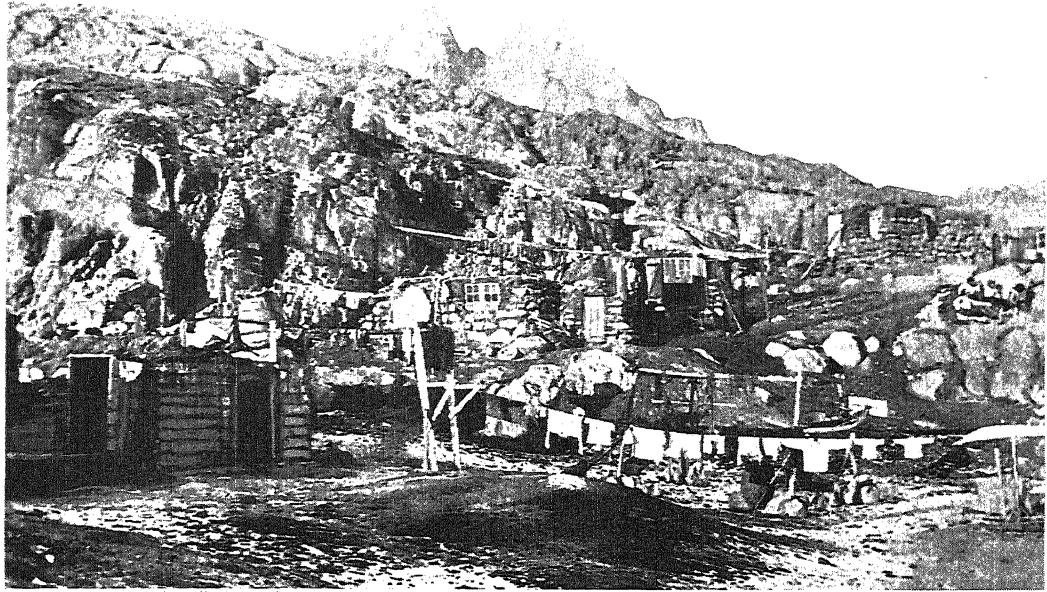


Photo: Brown Bros.  
NATHANAEL GREENE



Photos: U & U

**Greenland in Summer.** With the advent of spring, most of the natives leave their houses and camp in seal-skin tents. Below, the Danish village of Godthaab, in the southwest, on Davis Strait. The chimney in the illustration was the first factory chimney erected on the island.



Photos: U & U

**In North Greenland.** The settlement of Umanak, far north of the Arctic Circle, on Baffin Bay. Below, costumes of a mother, son, and daughter, whose home is in Umanak. 2959

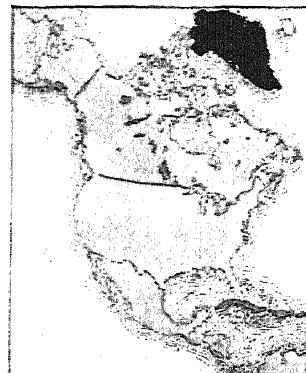
than three-fourths of its surface, the ice cap being in size nearly three times the area of California and in places 2,000 feet thick—the thickest of any in the world. This ice sheet is similar to the one which covered Eastern North America during the Ice Age (see GLACIAL EPOCH). There are thousands of glaciers, some of them the largest in the world.

Greenland is separated from the American continent by Davis Strait, Baffin Bay, and Smith Sound. More than 1,400 miles long and 690 miles wide, it covers an area of 827,300 square miles, twelve times greater than the six New England states and as large as British Columbia, Alberta, and Saskatchewan combined. Germany, France, Italy, and Spain combined lack over 100,000 square miles of being as large. Yet Greenland is in most respects worthless for the purposes and necessities of man. Only about 46,000 square miles can possibly be inhabited.

The interior forms a plateau, with an average height of 4,500 feet, surrounded by rocky coasts rising several hundred feet direct from the ocean. Here and there are mountains over 10,000 feet high. Many deep fiords and bays indent the coast, which resembles that of the west of Norway. The island is of volcanic formation, consisting of a mass of Archaean and igneous rocks similar to those found in Spitsbergen and part of Western Europe. At some far distant date, Europe, Spitsbergen, and Greenland were all connected by land which sank into the sea (see GEOLOGY).

**Climate.** During the long summer days of eighteen to twenty-two hours, the soil in some parts of the island, especially near the coast, produces luxuriant vegetation and flowers. The greater part of the surface, where free from ice, is covered with moss and lichens, and here and there alder, juniper, and other berries are found. The average temperature in the south of the island during summer is 48° F. In no part does the temperature rise above the freezing point, 32° F., for more than 140 days in the year, while in the north the cold is intense all the year round. The climate is very uncertain and liable to swift changes from bright sunshine to dense fogs or snowstorms.

**Resources.** Agriculture is impossible, but in a few favored spots a little gardening is done.



LOCATION MAP

The principal occupations are fishing and hunting. Cryolite, used in making aluminum, is mined and exported in quantities varying from 6,000 to 12,000 tons annually. Whale and seal oils, sealskins, and eiderdown form the principal exports and constitute the chief form of local currency, all internal trade being conducted by barter. Government stores supply the needs of the Eskimo natives and the few European inhabitants.

**Settlements and Government.** About one-twentieth of the island is occupied by Danish settlements, and for purposes of administration the colony is divided into North and South Greenland. An inspector, appointed by the king of Denmark, presides over each district. The most important settlements are Sydproven, the largest in the island; Godhaven, capital of North Greenland; Godthaab, capital of South Greenland; and Upernivik, the most northerly civilized port in the world. There is an Eskimo settlement at Etah, 400 miles north of Upernivik, and scattering settlements still farther northward.

**History.** Greenland was first colonized by Norwegians about 985, when Eric the Red led a party of voyagers to the island. Later, probably in the twelfth century, Norsemen are supposed to have made their way from Greenland to the American continent. After having been a separate state for many years, it became incorporated with Norway in 1260. For a time Greenland received no attention, all connection with Europe having ceased, but in 1585 it was rediscovered by Davis. Numerous expeditions visited the island, but no attempt at colonization was made until the Danes established mission stations on the west coast in 1721. Recent discoveries and explorations in and around the island are described under the heading POLAR EXPLORATION. The population of Greenland was about 14,000 in 1921, consisting chiefly of Christian Eskimos, with about 300 Europeans. All the people except Eskimos live on the west coast. McMillan's expeditions have added much to the world's knowledge of the island.

E.D.F.

**Related Subjects.** For the manner of life of the natives, see ESKIMO; see, also, McMILLAN, DONALD.

#### GREENLETS. See VIREO.

**GREEN MOUNTAIN BOYS**, a name assumed by a body of soldiers from Vermont during the Revolutionary War. They captured Fort Ticonderoga and Crown Point, and were responsible for the victory at the Battle of Bennington. They were organized originally by Ethan Allen, to oppose the claims of New York to the territory of Vermont. The Green Mountain Boys were the first to ask that Vermont be regarded as a state. This request was not granted until 1791, when it was admitted as the fourteenth state. See

ALLEN, ETHAN; WARNER, SETH; VERMONT (History).

**GREEN MOUNTAINS**, one of the oldest mountain ranges in North America. It belongs to the Appalachian system, beginning in the southern part of Connecticut and extending northward through the western part of that state and Massachusetts into Vermont and Quebec. The range is known as the Green Mountains in Vermont only; in Massachusetts and Connecticut it takes the name of the Berkshire Hills, Taconic Mountains, and Hoosac Mountains. Erosion and weathering have worn down the peaks, until in some places the mountains are merely low, round hills. The highest peaks are Mount Killington, Mansfield, Camel's Hump, Lincoln, and Jay; the greatest elevation is in Mansfield Peak, Vermont, 4,364 feet. The highest point crossed by a railroad is the small village of Summit in Rutland County, Vermont. Some of the best building stone in the country is found in the Green Mountains, while forests of hemlock, fir, pine, spruce, and other evergreens have given the name to this range. The Green Mountains are much frequented in summer by tourists, who are attracted by the beautiful scenery and pleasant climate. See **VERMONT** (The Land).

**GREEN MOUNTAIN STATE**, a popular name applied to Vermont (which see).

**GREENOUGH**, *green' o*, HORATIO (1805-1852), an American sculptor and art critic, was born at Boston, Mass. He was a Harvard graduate, and during his college days devoted himself especially to the study of anatomy. The most important works of his early career were a bust of Washington modeled from Stuart's portrait, and the design from which the Bunker Hill Monument was constructed. During the latter part of his life he had his studio in Florence, where he did his best work, including a colossal statue of Washington, now in the Capitol at Washington. Here are also to be found his groups of *The Rescue*, which took him eight years to complete. Among the well-known Americans who sat for portraits to him are John and John Quincy Adams, Henry Clay, John Jacob Astor, and John Marshall, notable men of the early period.

**GREEN RIVER**, an important tributary of the Ohio River, rising in Lincoln County, near the center of the state of Kentucky. It flows west and northwest until, after a course of 300 miles, it joins the Ohio about eight miles from Evansville. It is navigable for small vessels for about 200 miles, with the aid of locks and dams. Green River passes close to the mouth of the Mammoth Cave (which see) and receives the waters of the Echo River, which flow through an underground passage from the cave. See state map under **KENTUCKY**; also **KENTUCKY** (Its Rivers).

**GREEN RIVER**. See **COLORADO RIVER**; **UNTA MOUNTAINS**.

**GREEN ROOM**. See **WHITE HOUSE**.

**GREENSBORO**, N. C., the county seat of Guilford County, is situated northwest of the geographical center of the state, on the main line of the Southern and the Atlantic & Yadkin railroads. It is eighty-five miles west by north of Raleigh, the capital of the state.

Greensboro was established as a town in 1808 and chartered in 1870. It was named in honor of General Nathanael Greene, who was in command of the Continental army at the Battle of Guilford Courthouse, fought in March, 1781. In 1923 the city-manager form of government was adopted. The population, as estimated by the Federal Bureau of the Census, was 51,900 in 1928. The percentage of colored inhabitants is 19.1.

**Industries**. The principal manufactured products, of which there has been substantial increase during recent years, are denim, flannel, khaki cloth, and other cotton products; terra cotta; chemicals; medicine; iron and steel fabrications; wood products; full-fashioned silk hosiery; and sheet-metal products, the annual value of all manufactures being about \$47,500,000.

**Education**. Greensboro holds high rank as an educational center. Here are located North Carolina College for Women, a state institution with property valued at \$6,750,000 and an enrollment of 1,700; Greensboro College for Women, controlled by the Methodist Episcopal Church South; Greensboro Bible and Literary School; Bennett College for Women; and Immanuel Lutheran College. Near by are Guilford College, established in 1837 by the Society of Friends, and Oak Ridge Institute, founded in 1852. For negroes, technical and scientific education is provided at the North Carolina Agricultural and Technical College.

J.A.G.

**GREENSBURG**, PA. See **PENNSYLVANIA** (back of map).

**GREEN SICKNESS**. See **ANAEMLIA**.

**GREENVILLE**, MISS. See **MISSISSIPPI** (back of map).

**GREENVILLE**, S. C. See **SOUTH CAROLINA** (back of map).

**GREENVILLE**, TEX. See **TEXAS** (back of map).

**GREENVILLE**, TREATY OF. See **WAYNE**, ANTHONY.

**GREEN VITRIOL**, *vit' rih ul*, another name for copperas (which see).

**GREENWICH**, *grin' itch*, ENGLAND. See **ENGLAND** (The Cities).

**GREENWICH OBSERVATORY**. See illustration, in article **ENGLAND**.

**GREGG**, JOHN ROBERT, originator of a system of shorthand. See **SHORTHAND WRITING**.

**GREGORIAN CALENDAR**. See **CALENDAR**.

**GREGORIAN CHRISTIANITY**. See **ARMENIA** (History).

**GREGORY**, the name of sixteen Popes, at least two of whom were among the most

important occupants of the Papal chair. The name has also been borne by two antipopes (see ANTIPOPE).

**Gregory I**, called THE GREAT (about 540-604), was of noble family and was educated not for the Church but for the law. However, he was vitally interested in religious matters, and when he came into possession of the family fortune, he devoted it to the founding of monasteries. To one of these, in his native city of Rome, he retired, and there took the vows of a monk. One day, so the story goes, while walking in the market place he saw several Anglo-Saxon youths being sold as slaves, and inquired of what nationality they were. "Angles," was the reply. "Not Angles, but Angels," exclaimed Gregory, referring to their fair skin and light hair, and from that moment he vowed that he would go as a missionary to Britain, the home of these beautiful youths. So highly was he esteemed in Rome, however, that Pope Benedict I would not allow him to go, and under Benedict's successor, Pelagius II, he was sent on important services to Constantinople.

When Pelagus died in 590, Gregory was chosen Pope despite his protests, and his wise, zealous administration of his office fully justified the choice. He organized the ritual and the services of the Church, and was especially active in missionary enterprise. Augustine (which see) was sent to England on the mission which Gregory himself had desired to undertake, and missions were also established in Sicily, in Sardinia, and in Lombardy. His writings include an important *Exposition of Job* and *The Book of Pastoral Rule*.

**Gregory VII**, Pope from 1073 to 1085, was actuated in almost every move of his important reign by the conviction that the Pope was the sovereign ruler in matters political as well as religious. The controversy between him and Henry IV on this subject made much of the history of the time.

Hildebrand, as he was called before his election to the Papacy, was born in Tuscany about 1020, of a humble family, and was educated for the Church. His rise in churchly rank was steady, and his election in 1073 to the Papal chair was unanimous. One of his first acts was the prohibition of clerical marriage, and in this he met with great opposition. Not daunted, he turned his attention against the abuse of lay investiture, as it was called. That is, he forbade the people to recognize the authority of any priest or Church official who had received his office from a secular ruler. As this right of investiture had been the only hold Emperor Henry IV had had on the clergy of his dominions, the emperor refused to abide by the Papal decrees, and continued to recognize the bishops whom he himself had created. Gregory summoned him to appear in Rome, but Henry assumed a defiant attitude and declared Gregory deposed.

But the Pope had stronger weapons in his hands. He not only excommunicated Henry, but released all Henry's subjects from their allegiance to him, and the emperor realized the uselessness of resistance. To Canossa, where the Pope was staying, he went to make his submission, and in the words of Gregory himself, "having laid aside all belongings of royalty, wretchedly, with bare feet and clad in wool, he continued for three days to stand before the gates of the castle." Add to this that it was severe winter weather, and that he had to stand in the snow, and the depths of Henry's humiliation may be seen.

Finally, the Pope relented and absolved him, but Henry had submitted only to gain his point, and in 1080 again rebelled against the Pope and declared him deposed. While Henry was besieging Rome, Gregory shut himself up in the Castle of Sant' Angelo, and though he was liberated in 1084, he was obliged to withdraw to Salerno. There, in retirement, he died, exclaiming almost with his last breath, "I have loved justice and hated iniquity; therefore I die in exile." See HENRY (IV, Germany).

**Gregory XIII** (1502-1585) was made Pope in 1572, after he had served as theologian at the Council of Trent, as legate to Spain, and as cardinal. He was especially interested in education, believing that only through its aid could the growing heresies of Protestantism be combated, and he did much to aid the Jesuits. But his reign is of general interest chiefly because of his reform of the calendar, the Reformed or Gregorian calendar in use to-day dating from his time. See CALENDAR.

G.W.M.

**GRENADA**, *gre nah' dah*, one of the Windward Islands (which see).

**GRENADE**, *gren ayd'*, a small explosive bomb, formerly used in war by specially trained men called grenadiers. It usually consisted of a hollow metal ball, filled with gunpowder and exploded by a fuse or percussion cap. Grenades were extensively used in the seventeenth and eighteenth centuries, but during the nineteenth century were regarded as useless and obsolete. The war between Japan and Russia, in 1904, saw a revival of these weapons, and they were used with deadly effect during the siege of Port Arthur. In the World War, grenades were important weapons in trench warfare, and were used by all the armies. When filled with modern explosives, they are found to be very effective. To-day, grenades are made of steel tubes filled with guncotton, nitroglycerin, picric acid, or other explosives, and are thrown by hand or discharged by catapults into the trenches or the ranks of opposing forces. See EXPLOSIVES.

**GRENADIER**, *gren a deer'*, originally one of a body of European soldiers specially trained in the use of grenades, or bombs. Such weapons had been in use long before it was found necessary to organize special companies of grenade-throwers. The grenadiers were picked men, usually the tallest in the regiment, and they wore a distinctive headdress consisting of a loose fur cap with a peak and with ear flaps. This headdress has now developed into the high bearskin hat of the British Grenadier Guards.

**GRENDEL**. See BEOWULF.

**GRENFELL, SIR WILFRED THOMASON** (1865- ), a physician who has been termed the guiding genius of Labrador. Whether he is acting in the capacity of medical missionary, clergyman, judge, doctor, policeman, or volunteer postman, he performs his tasks with a vigor and enthusiasm that have made his influence felt in every part of Newfoundland and Labrador.

Brought up in an influential English family, for he was born near Chester and was educated at Oxford and at London Hospital, he finds in Labrador "the joy of the opportunity of service." In 1889, under the auspices of the Royal National Mission to Deep Sea Fishermen, he fitted out a hospital ship and accompanied the fishermen of the North Sea on their cruises from the Bay of Biscay to Iceland. After three years in the work there, he began his activities in Labrador. Along the coast of Saint Anthony, at Battle Harbor and Harrington Harbor in Newfoundland, and at Indian Harbor in Labrador, he built hospitals, each of which is the home of a resident doctor and nurse. The mission headquarters are at Saint Anthony, where Dr. Grenfell lives; here also he established an orphanage.

His little hospital ship, the *Strathcona*, is his summer home. In June of each year, he starts on a cruise along 1,500 miles of a bleak, inhospitable coast, and goes ashore at the scattered villages. He gives the royalties from his books—*Adrift on a Pack of Ice, Off the Rocks, Labrador, Down to the Sea, A Man's Faith, The Harvest of the Sea, Down North on the Labrador*, and *Immortality*—and the income from his lectures as well as his unselfish service, to the fisherfolk of Labrador. In 1909 he married Anna Elizabeth MacClanahan of Chicago, Ill. In 1928 he was elected rector of Saint Andrew's University. See LABRADOR; NEWFOUNDLAND.

**GRENVILLE, LORD.** See REVOLUTIONARY WAR IN AMERICA (Causes of the War).

**GRESHAM'S LAW**, the principle that "bad money tends to drive out good." This law is named after Sir Thomas Gresham, founder of the Royal Exchange in London, but he was not the first man to discover the tendency. The "law" is merely the statement of the obvious fact that when coins of different bullion value circulate side by side, the cheaper, if sufficient in number, will displace the dearer (see BULLION). If coins of full weight are put in circulation with coins of light weight, the full-weight coins will be hoarded, and the light-weight coins will be used in making exchanges. This fact appears to have been first noticed in the thirteenth century, when dishonest dealers chipped off particles from gold and silver coins, which were circulated until they were so thin that they were easily broken. Gresham states the principle as follows:



DR. GRENFELL

Photo: U &amp; U

Where by legal enactment a government assigns the same nominal value to two or more forms of circulatory medium whose intrinsic values differ, payments will always, as far as possible, be made in that medium of which the cost of production is least, the more valuable medium tending to disappear from circulation.

In modern times, there have been instances of the working of this principle. In 1896 American owners of gold coins hoarded them because of the possibility that silver might circulate on a legal parity with gold. During the World War and post-war period, the issuance of paper money in enormous quantities in Europe caused the disappearance of metal coins. See BIMETALLISM; MONEY. E.J.

**GRETNA GREEN**, a village in Dumfries-shire, Scotland, eight miles north of Carlisle and just over the English border. It is noted for runaway marriages formerly celebrated there under the lax Scots law, which was satisfied merely with mutual promises of the man and woman, made in the presence of witnesses. The fugitive lovers were united in marriage by the clergyman in very speedy manner; and the fee, very flexible in amount, was demanded when the service was about three-quarters performed, so as to insure payment before the possible arrival of irate parents. There were four places in Gretna Green where these marriages took place. However, this practice was discontinued by an act of Parliament in 1856, which declared that no irregular marriage in Scotland should thereafter be valid unless one of the parties had resided in Scotland for twenty-one days. Today any town to which eloping couples flee to get married is popularly termed Gretna Green.

**GRÉVY, gra've'**, FRANÇOIS PAUL JULES (1807-1891), a French statesman and the third President of the French republic, was born at Mont-sous-Vaudrey, Jura. He studied law in Paris, was admitted to the bar in 1837, and became a brilliant member of the profession. In 1868 he was elected a member of the Chamber of Deputies, which corresponds to the American House of Representatives, and in 1873 became president of the National Assembly. In 1879 he was elected President of the republic, upon the resignation of President MacMahon. Grévy entered on a second term of office in 1885, but in 1887 was compelled to resign on account of a scandal involving his son-in-law. See FRANCE (History).

**GREY, gray**, ALBERT HENRY GEORGE, fourth Earl (1851-1917), a British statesman and colonial administrator, Governor-General of Canada from 1904 to 1911. Grey was educated at Harrow and at Trinity College, Oxford, where he was graduated in 1873. Five years later, he was elected to the House of Commons, but was unseated on a technicality.

He was again elected in 1880, and sat until 1886. In 1896 and 1897 he was administrator of Rhodesia, and he became the close friend and supporter of Cecil Rhodes in his plans for consolidating British South Africa. From 1898 to 1904 he was a director of the British South Africa Company, and from 1899 to 1904 was lord-lieutenant of Northumberland. During the seven years he spent in Canada, he became very popular. He was interested in the social and economic progress of the Dominion, and took an active part in all important public movements. He sought to promote Canadian patriotism, and at the same time to stimulate the sense of loyalty to the British Empire.

For several generations Earl Grey's family has had more or less intimate connection with Canada. His sister Mary was the wife of the fourth Earl of Minto, his predecessor as Governor-General of Canada. His uncle, Henry Grey, third Earl (1802-1894), was British Colonial Secretary from 1846 to 1852. It was due to him in no small degree that Canada won responsible government when that achievement was brought about.

**GREY, CHARLES**, second Earl (1764-1845), an English statesman whose greatest work was the passage of the Reform Bill of 1832. He was born at Fallodon, in Northumberland, studied at Eton and at King's College, Cambridge, and like most young men of his class, completed his education by traveling on the Continent. In 1786 he entered Parliament, where he at once joined Charles Fox (which see), to whom he ever afterward remained faithful. He helped to manage the impeachment of Warren Hastings (which see), and as early as 1797 began to bring forward petitions for electoral reform. In the ministry of 1806 he was First Lord of the Admiralty, and on Fox's death, Secretary of State for Foreign Affairs; and he helped to put through the bill for the abolition of the slave trade in the British possessions.

From 1807 to 1830 Earl Grey was a member of the Opposition in the House of Lords, to which he had been admitted in 1807; but in 1830 he came into power as Premier. At once he began the struggle to put through a reform bill which should equalize suffrage. Twice the bill was passed by the Commons and rejected by the Lords, and in 1832 Grey demanded of King William IV that he create enough new peers to put through the bill. William consented, but the mere threat of such action was enough to change the attitude of the Lords, and on June 4, 1832, the Reform Bill was passed.

Grey retired from office in 1834 and spent the rest of his life in retirement. See GREAT BRITAIN (History: The Reform Era).

**GREY, EDWARD, VISCOUNT GREY OF FALLODON** (1862- ), until 1916 known as Sir Edward Grey, is a British statesman and diplomat. In 1905 he was appointed Secretary of

State for Foreign Affairs, a step that was severely criticized at the time, for Grey was almost unknown to the public. In 1885, shortly after taking his degree at Balliol College, Oxford, he entered the House of Commons, and from 1892 to 1895 was Under-Secretary for Foreign Affairs in the Gladstone and Rosebery ministries. Between 1895 and 1905, when the Conservatives were in power, Grey remained in Parliament. Always inclined to be reticent, he took small part in the discussion of public questions, except when foreign affairs were under consideration; in this field he won general recognition for his ability.



Photo: Brown Bros.

SIR EDWARD GREY

office at a critical time, and between 1905 and 1914, when the World War began, there were several occasions when it seemed as if a general European war were almost unavoidable. In each of these crises, Grey was conspicuous, particularly in 1912, when his influence led to the London conference of the powers to consider the Balkan question. He presided at the conference, and to a large degree he was responsible for the agreement to form Albania. Thereafter he stood second to none among the diplomats of Europe. In 1914 Grey was called on to play a difficult rôle in the complicated negotiations preceding the war (see WORLD WAR). In 1916 he was created an earl, but by special permission of the king, was allowed to take the lower rank of viscount "for personal and family reasons." It was generally assumed that the change was made in order to prevent confusion with Earl Grey, the former Governor-General of Canada; the two Greys are not related.

The published memoirs of Sir Edward appeared in 1925, under the title *Twenty-five Years, 1892-1916*.

**GREY, LADY JANE** (1537-1554), known as "the nine days' queen," was a girl of rare accomplishments whom misfortune overtook at almost every turn. She was the granddaughter of Henry VII of England, and daughter of Henry Grey, afterward Duke of Suffolk. At the age of sixteen, she was married to Lord

Guilford Dudley, son of the Duke of Cumberland.

Edward VI, who died in 1553, on his deathbed settled upon Lady Jane Grey the succession to the crown. He was influenced to do this by the persuasions of Cumberland that, if the crown should descend to Mary, the work of the Reformation would be undone and the liberties of the kingdom would be endangered. The news was received by Lady Jane with unwelcome surprise, as it was by the people later, and it was long before she could be induced to accept the dignity. Edward died on July 6, and the news of his death was kept secret for four days, until after Lady Jane had been proclaimed queen.

However, within less than two weeks after the proclamation, Mary's claims were recognized, and Lady Jane was imprisoned in the Tower of London. She and her husband were beheaded the following February, amid universal sympathy and compassion. See MARY (I, England); TOWER OF LONDON; ENGLAND (History).

**GREY, ZANE** (1875- ), an American who turned from the profession of dentistry to become a writer of fiction. He was born in Zanesville, O., was graduated in dentistry at the University of Pennsylvania in 1896, and practiced in New York state until 1904. He then began the career for which he proved well fitted—that of a writer of stories whose scenes are chiefly laid in the West. Several of these were adapted successfully for the moving-picture screen.

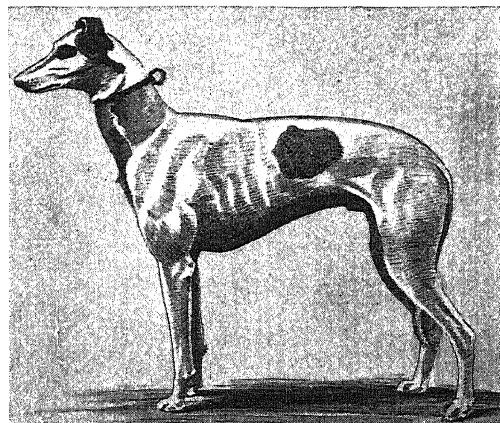
**Grey's Books.** Principal among the volumes he has published are *Betty Zane*, *The Spirit of the Border*, *The Last Trail*, *The Last of the Plainsmen*, *The Short-Stop*, *The Heritage of the Desert*, *The Young Forester*, *The Young Pitcher*, *The Young Lion Hunter*, *Riders of the Purple Sage*, *Ken Ward in the Jungles*, *Desert Gold*, *The Light of the Western Stars*, *The Lone Star Ranger*, *Rainbow Trail*, *The Border Legion*, *Wildfire*, *U. P. Trail*, *Desert of Wheat*, *Tales of Fishes*, *Man of the Forest*, *The Mysterious Rider*, *To the Last Man*, *The Day of the Beast*, *Tales of Lonely Trails*, *The Wanderer of the Wasteland*, *Tappan's Burro*, *The Call of the Canyon*, *Under the Tonto Rim*, *Forlorn River*, *Fighting Caravans*, and *Nevada*.

**GREYHOUND**, a tall, slenderly built dog, which hunts by sight, not scent. It is known as the fleetest of dogs, and on level country it can outdistance the horse. There are several

varieties, some long-haired, others short-haired, but all are distinguished by a long, strong muzzle, very low forehead, short lips, bright eyes, long, thin legs, small muscles, and contracted belly. The name does not refer to color, although many are dark gray, but is derived from the Icelandic word *grey*, meaning *dog*. The American greyhound was used, especially in the West in earlier days, for hunting jack rabbits, pronghorn antelopes, and coyotes. The English greyhound is used to hunt hare.



LADY JANE GREY



THE GREYHOUND

Other varieties are the Irish greyhound, to whose development clubs are devoted; the Russian wolfhound, the Scotch deerhound, the Italian greyhound, and Persian *long dogs*. See DOG.

M.J.H.

**GREYLOCK, MOUNT.** See MASSACHUSETTS (The Land); TAONIC MOUNTAINS; BERKSHIRE HILLS.

**GRIBOYEDOV**, *gre bah veh' dof'e*, ALEXANDER. See RUSSIAN LITERATURE.

**GRID.** See STORAGE BATTERY.

**GRIDIRON, DIAGRAM OF.** See FOOTBALL.

**GRIDLEY, CAPTAIN CHARLES VERNON.** See SPANISH AMERICAN WAR.

**GRIEG, greeg**, EDVARD HAGERUP (1843-1907), one of the most universally popular and beloved of modern composers, through whose influence Norwegian moods and Norwegian life have pervaded the world of music. One critic has called him the "Chopin of the North," and all authorities unite in declaring him one of the most original of the modern geniuses in the musical world.

Grieg was born in Bergen, Norway, and studied at Leipzig and Copenhagen. He made several triumphant concert tours through Norway, Italy, Germany, France, and England, but he preferred to devote himself to composition, rather than to recitals. His compositions are noted for their brilliant and effective local coloring; his music is filled with the enthusiasm

and vigor of Scandinavian life, and many of his themes are drawn from Norwegian folk stories and national airs.

**His Chief Works.** Grieg composed 125 songs, which but two or three masters have equaled and which his wife inspired and interpreted. Among his other famous compositions are the *Peer Gynt Suite*, *Elegiac Melodies*, *Concerto in A Minor*, and *Sonata in E Minor* for the piano, and the overture *I'm Herbst*.

**GRIFFIN, W. BURLEY.** See CANBERRA, AUSTRALIA.

**GRIFFIN, ARTHUR (1872-1922).** See IRELAND (History).

**GRIFFITH, DAVID WARK (1880- ),** an American producer and director of moving pictures, one of the pioneers in the industry.

Griffith was born at La Grange, Ky., and educated in the public schools. He became identified with the motion-picture industry in 1908, first as an actor, then as director for the Biograph Film Company. As an independent producer, he created an international reputation with *The Birth of a Nation*, the first of the great spectacle pictures. This dramatic and thrilling story of the Civil War period was followed by *Intolerance*, *Hearts of the World* (based on the World War), *Way Down East*, *Broken Blossoms*, *Orphans of the Storm* (a tale of the French Revolution), and *America*, all of which followed the formula employed in *The Birth of a Nation*.

Though Griffith received high commendation for the originality and effectiveness of his direction, most of his pictures were not financially successful, and he became a salaried director for some of the great producing companies of Hollywood. He was instrumental in bringing before the public Mary Pickford, Lillian and Dorothy Gish, Richard Barthelmess, and other stars. See MOVING PICTURES.

**GRIMMS' FAIRY TALES.** What joy and entertainment such stories as *Hänsel and Gretel*, *Rumpelstiltskin*, *The Goose-Girl*, *Tom Thumb*, and *Snow-White* have furnished to boys and girls, who for nearly a century have been reading these fascinating tales collected by two brothers named Grimm. During the first half of the last century, these brothers went out among the country people of their fatherland, Germany, and collected all the fairy stories they heard. These were stories that had been told by German mothers for years, but had never been written. The Grimms were grave and learned men whose original wish was

to produce books for students, but they made themselves famous forever when they published the fairy tales which they had collected. The stories, which were written in German, have been translated into all the principal languages of the world, and have made the name of the brothers Grimm as well known in America as it is in their native land. The stories are short and simple tales about beautiful maidens and kings or princes, who always "live happy ever afterward," but even an older person, in whom the blessed gift of imagination has not died, can enjoy them as much as a child. See FAIRIES; FOLKLORE.

**Jakob Ludwig Grimm (1785-1863) and Wilhelm Karl Grimm (1786-1859)**, the brothers Grimm, as they are generally called, were not in the least like the sort of people one would expect to find telling fairy tales. Both were sober, industrious scholars, born in Hanau, Germany, who became professors in Berlin after receiving their education at the University of Marburg. In 1837 they were among the seven professors who protested against the abolition of the constitution by the king of Hanover, and both were banished for a short time. Much of their writing was along scholarly lines; some of Jakob's work is especially important, for he published a German gram-

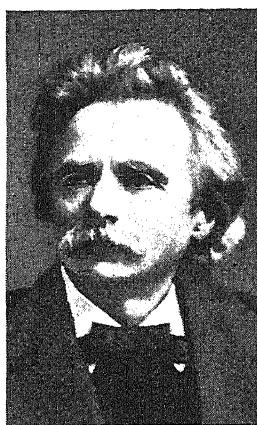


Photo: Brown Bros.  
GRIEG

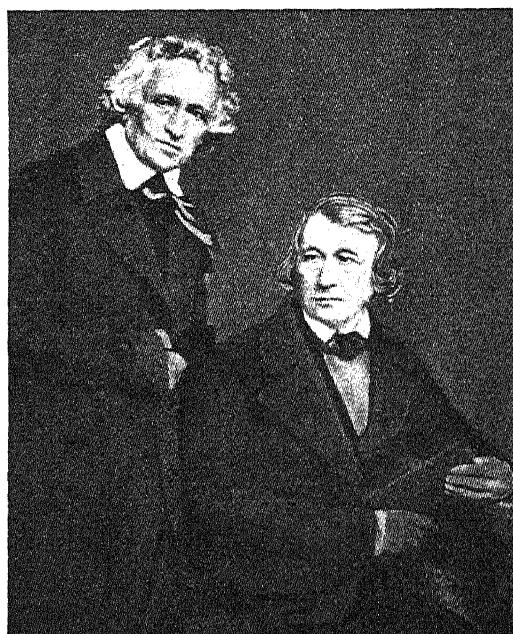


Photo: Brown Bros.  
JAKOB AND WILHELM GRIMM

mar of four volumes in 1819, which laid the foundation for historical investigation of the language. When writing their fairy tales, they used the fictitious name of GAMMER GRETHEL, but their *Kinder und Hausmärchen* is generally known as *Grimms' Fairy Tales*, where the authors' fame rests on these stories alone.

**GRINNELL LAND.** See ELLESMORE LAND.

**GRIPPE**, *grip*. See INFLUENZA.

**GRISCOM**, SAMUEL, father of Betsy Ross (which see).

**GRIS-NEZ**, *gre-na'*, CAFE, the point of France nearest to the English coast, the distance across to Dover being less than twenty-one miles. It is at an equal distance from Calais and Boulogne, in the department of Pas de Calais. The headland is bare and grayish, hence the name, which means *gray nose*. On it stands a lighthouse with a revolving light 233 feet above the sea, which may be plainly seen from England. It is to this that Matthew Arnold, in his *Dover Beach*, refers when he says—

On the French coast the light comes, and is gone.

**GRISSBACH FALLS**. See SWITZERLAND (Waters).

**GRISTLE**. See CARTILAGE.

**GROMWELL**, the common name of a genus of weedy herbs belonging to the borage family. Eight or ten species occur in North America. The *common gromwell*, which grows along roadsides and in pastures in the eastern part of the United States and Canada, is an erect, branching plant with broadly lance-shaped leaves and a funnel-shaped corolla that conceals the shorter calyx. At one time the plant was considered a cure for stones in the bladder. Medicinal properties, in fact, were erroneously ascribed to most members of the group. Some of the species have roots that produce a red dye similar to alkanet. The name *gromwell*, which comes from Greek words for *stone* and *seed*, refers to the hard nutlets of the plants. B.M.D.

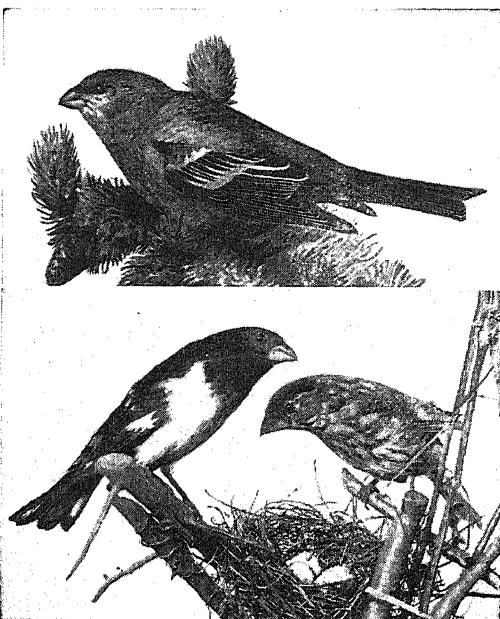
**Scientific Names.** The scientific name of the genus is *Lithospermum*; of the family, *Boraginaceae*.

**GRONINGEN**, *gro' ning en*. See NETHERLANDS, THE (The Cities).

**GROSBEAK**, *grose' beek*, a general name for various beautiful birds of the finch family, whose beaks are so thick they can open even the stones of cherries. The *rose-breasted grosbeak*, which is seen throughout Eastern North America from Southern Canada to South America, is one of the prettiest of the species. It has a sweet, joyous song. The farmers of Pennsylvania call this bird the *potato-bug bird*, because it feeds on destructive potato beetles. It also devours caterpillars, scale insects, and other injurious insects. The male is a little smaller than a robin, is largely black, with white lower parts and a beautiful rose-red breast. Its blunt beak is yellow. A western species is called *black-headed grosbeak*.

In the Southwestern United States is found the shy, handsome *blue grosbeak*. In solitary regions of Central and Northwestern America, the brown and yellow *evening grosbeak* feeds

on buds and seeds of maples, evergreens, and elders. Its song is a "jerky" warble. It received its name from the belief that it sang only in the evening. It does sing in the daytime, however, but only in the nesting season. The evening grosbeak nests from Northern Minne-



Photos: Visual Education Service

#### GROSBEAKS

Above, pine grosbeak; below, rose-breasted.

sota northward, but it is a rare bird, and very few nests have ever been found. In the winter this bird is found in the Northern states, in flocks containing from six to sixty individuals. They feed at this time on the buds of maples and the seeds of the box-elder. Seeing a flock of evening grosbeaks marks a red-letter day for a bird-lover. They are best known as winter visitors in the upper Mississippi Valley. The plumage of the adult males is a very conspicuous combination of black, white, and yellow.

The western evening grosbeaks breed in the far Northwest and in the mountains as far south as Arizona and Mexico. In winter, these birds descend from the mountains and are common visitors at Portland, Ore., and around Mount Shasta. The hardy *pine grosbeak* is common in pine and juniper woods of the Canadian provinces. This bird, with rose-red plumage, mixed with slaty gray, is also sometimes seen in winter in New England and as far west as Minnesota.

One species of grosbeak is called *hawfinch* in Europe. In America the cardinal is sometimes called grosbeak. See CARDINAL BIRD. D.L.

**Scientific Names.** Grosbeaks belong to the family *Fringillidae*. The rose-breasted is *Zamelodia ludovi-*

*ciana*; the black-headed is *Z. melanocephala*; the blue is *Guiraca caerulea*; the evening is *Hesperiphona vespertina*; the pine is *Pinicola enucleator*.

**GROSGRAIN**, *gro' grān'*, a grained or corded fabric, closely woven, with a firm or stiff surface, with fifty to seventy ribs per inch. It may be weighted with silk, or filled with cotton. It wears well, when not too heavily weighted.

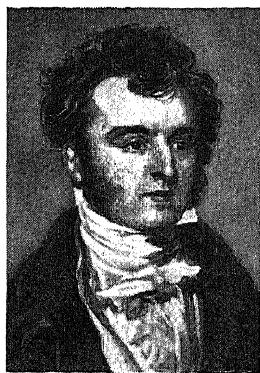
**GROSVENOR**, *gro' vēn ur*, GILBERT HOVEY (1875- ), an editor and geographer, distinguished not only for his contributions to scientific knowledge, but also for his services in creating popular interest in geography and the work of exploration. Grosvenor was born in Constantinople, Turkey, and began his education in the preparatory department of Robert College. In 1897 he was graduated at Amherst College (Mass.), and later received advance degrees from that institution and Georgetown University, Washington, D. C. After teaching for a year, he became assistant editor of the *National Geographic Magazine*, and in 1903 was made editor of that magazine and a director of the National Geographic Society. Since 1920, Dr. Grosvenor has been president of the society, which has increased under his directorship from 900 members to more than 1,150,000. In 1919 a lake discovered in Alaska was named Grosvenor Lake in recognition of his services in fostering exploration in Alaska.

**His Writings.** These include *The Exploration of the Nineteenth Century*, *Young Russia*, *The Land of the Best*, *Flags of the World*, *The Hawaiian Islands, Discovery and Exploration*, *A Maryland Pilgrimage*, an historical summary of Peary's *The North Pole*, and numerous articles for magazines.

**GROTE**, GEORGE (1794-1871), an English historian who chose ancient Greece as his particular theme, but also wrote on Parliamentary questions related to his own country. He was eminent also as a philosopher and politician, and was a tireless advocate of university



GILBERT GROSVENOR



GEORGE GROTE

education. He is buried in Westminster Abbey, near the grave of Macaulay.

**Literary Output.** Grote's first published book was *The Statement of Questions of Parliamentary Reform*, which advocated popular representation, vote by ballot, and short Parliaments. In 1831 he published his important book, *Parliamentary Reform*, an elaboration of his Statement. However, the work which brought him greatest fame was his *History of Greece*, which appeared in twelve volumes between 1845 and 1856; it is a comprehensive study of Grecian history up to the death of Alexander. He later turned his attention to the study of Greek philosophy, which resulted in two books; he published the one on *Plato*, but that on *Aristotle* was destined to remain unfinished.

**GROTIUS**, *gro' shi us*, OR DE GROOT, HUGO (1583-1645), a Dutch jurist, theologian, statesman, and poet, is honored especially as the founder of the science of international law (which see). He was educated at the University of Leyden, taking his degree in his fifteenth year. In 1613 he was made chief magistrate of Rotterdam; in 1619, as a leader of the Remonstrant doctrine, which was opposed to strict Calvinism, he was condemned to life imprisonment at Loewenstein, but escaped, with the assistance of his wife. From 1635 to 1645 he was Swedish ambassador to France.

**His Writings.** Grotius' chief work, *On the Law of War and Peace*, is considered the basis of international law, and has been widely used as a textbook. His other writings include brilliant Latin and Dutch poems, and able translations in Latin verse from Greek authors.

**GROUND CUCKOO.** See ROAD RUNNER.

**GROUND HEMLOCK.** See YEW.

**GROUND HOG.** Who is not acquainted with the superstition about "ground-hog day"? It is said that the ground hog comes out of his burrow on the second day of February, looks about him, and if he sees his shadow, decides that spring is still six weeks off. He thereupon crawls back into bed to finish his winter's nap. Though the tradition has no basis of fact, the details of the story suggest some of the habits of this little animal. He hibernates in winter and he lives in a burrow.

There are several species of ground hog in North America, of which the common ground hog of the Eastern states and Canada is typical. The ground hog is a small mammal related to the marmots, and is also called *woodchuck* and *American marmot*. It may be recognized by

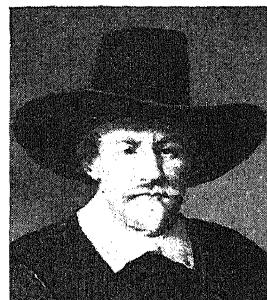


Photo: Brown Bros.

GROTIUS

its long, coarse fur, which is blackish or grayish above and chestnut-red below, and by its short, thick legs, bushy tail, broad, flat head, and long whiskers. It is fifteen to eighteen inches long, or about the size of a house cat. It has a fondness for the edges of sparsely wooded areas, and digs a burrow which is divided into several compartments. In burrowing, the animal throws out the dirt with its sharp-clawed forefeet and scrapes it back with the hind ones. Red clover and alfalfa and early garden vegetables are relished by the ground hog. When it leaves home for a meal, it first squats on its haunches before the door, to take a survey of the premises, turning its sharp eyes and ears in all directions for sights and sounds of danger. If the way is clear, off it bounds to the field or garden. Woodchucks do not

lay up stores of food for winter use, but they eat glutonously toward the close of summer, and while sleeping during winter, they are nourished by the stored food in their bodies.

In the Western states is found a species so injurious to growing crops that the United States Department of Agriculture is seeking its extermination through the use of poisonous gas. In Washington, 15,000 of these animals were killed within an area of ten square miles. Woodchucks are valueless economically, as their flesh is not well flavored and their hair is too coarse to be desirable for fur. W.N.H.

**Scientific Name.** Woodchucks belong to the ground-squirrel family. The common species of the Eastern states is *Marmota monax*.

**GROUND-HOG DAY**, a day in February connected with a curious tradition. See FEBRUARY; GROUND HOG.

**GROUND WATER.** See GEOLOGY (Work of the Hydrosphere).

**GROUSE, grouse.** This name belongs to a group of dull-plumaged fowl-like game birds, native to the northern hemisphere. There is much confusion in the use of the names *grouse*, *quail*, and *partridge*. The correct application of these terms is indicated in this article and in those under the headings QUAIL and PARTRIDGE.



HE SEES HIS SHADOW

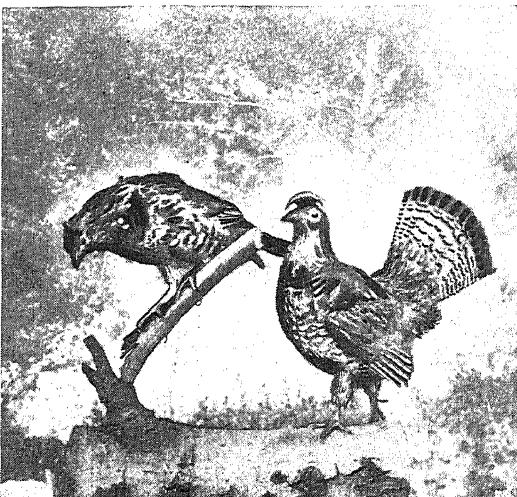
**General Characteristics.** Like fowls, grouse have four toes, the hind one raised above the ground. Feathers conceal the nostrils and fill the nasal groove. As these birds frequent high altitudes, most species have feathered legs to keep those parts from being frozen. They have well-developed breast muscles, which are the most edible portions of the birds. The heads of grouse are high at the rear and contain a wonderfully developed brain, and the rare intelligence shown by the birds in eluding sportsmen makes the chase for them interesting. It is the habit of grouse to lie hidden until the huntsman's trained dogs are upon them, and then to fly off rapidly with a great whirring of their stiff-feathered, concave wings. Under such circumstances a man must be cool and quick to shoot the bird.

In breeding season, the males become fierce and fight each other viciously, after dancing, booming, drumming, and performing before the hens. The victorious male then mates with all the females of the "harem" for which he has fought. As soon as the females begin to sit, however, in their well-hidden nests on the ground, the male leaves them alone to take entire care of the young.

There are usually from ten to fifteen rich-buff, brown-dotted eggs, which hatch into downy brown birds. These chicks leave the nest almost immediately after breaking from the shell. When the brood is in danger, the mother grouse gives a shrill call, and the chicks quickly scamper to hiding places; she then pretends to be lame, to attract attention to herself and to lead the intruder away from her babies, but when the enemy approaches too close, she quickly flies away. When the young no longer need care, father grouse returns and joins the flock, or *covey*.

In the summer, grouse feed chiefly on insects and berries. In autumn, grainfields are frequently visited, for seeds are added to their diet; and in winter, when snow covers the ground, catkins, leaves, and buds constitute the food of grouse families. In the main their food habits are beneficial.

**Ruffed Grouse.** One of the most important American game birds is the superb ruffed



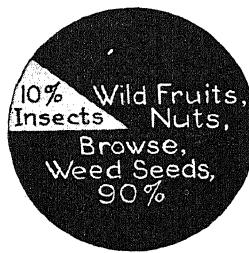
Photos: Visual Education Service

## THE BLUE AND THE RUFFED GROUSE

At left, the blue grouse is protecting her nest, but she permitted the photographer to get the picture he desired. At right, the ruffed grouse, male and female.

grouse, called *pheasant* in the South and *partridge* in the North. This handsome bird is nearly a foot and a half long. Its reddish-brown plumage is variegated with black, gray, and white. Large tufts or ruffs of shiny black feathers, found on the sides of the neck, give the bird its name. It frequents wooded regions from Canada and Alaska south to California, Colorado, Tennessee, and Northern Georgia, and is a permanent resident in its range. The ruffed grouse is famous alike for its delicious and tender flesh and for the strange drumming sound made by the male. Naturalists differ as to the source of this sound, but

it is produced while the bird beats the air rapidly with its wings, and has been described as *thump-thump rup-rup r-r-r*. This grouse, strong of wing, vigorous, wily, and watchful, is well fitted to fight for existence. But the desire of sportsmen is rapidly decreasing the ranks of



FOOD OF THE RUFFED GROUSE

ruffed grouse, and as the birds do not migrate, the states in which they appear must strengthen existing game laws to prevent their extinction.

**Prairie Chicken, or Pinnated Grouse.** This bird of the open prairie is another member of the grouse family. It was once numerous throughout the Central United States, but is almost exterminated in many regions. Prairie chickens are now in need of much legal protection.

The original prairie is needed for farming. Too much hunting should not be allowed, and marshes and sloughs, where the birds roost in winter, should not be burnt over. The plumage of the prairie chicken is brownish-red with bars and crossings of black. On each side of the neck of the male there is a large loose sac which can be inflated at will, to look like an orange.

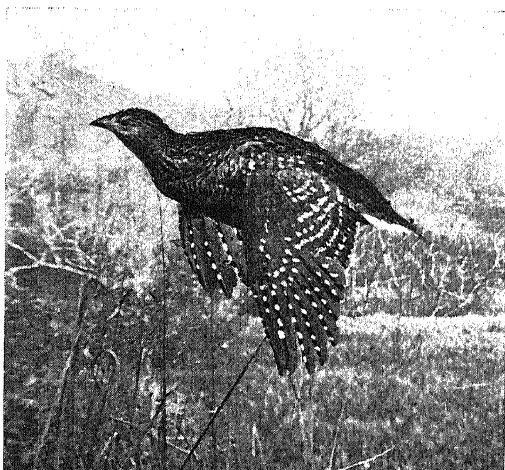


Photo: Visual Education Service

## PRAIRIE CHICKEN

At the back of the neck are tufts of long black feathers. All these peculiarities are to attract the females at mating time. Unlike other grouse, prairie chickens migrate locally, and they can fly long distances. They gather in flocks during the winter, in regions where they find both food and shelter. They may feed in the corn-

fields during the daytime, and toward evening fly a mile or more to their sleeping places in the tall, dead grass of a lake shore or river bottom. A winter flock may contain one or two dozen birds, or it may contain thousands of them. In February, 1918, a flock of prairie chickens, which contained about 10,000 birds, was seen near Appleton, in Western Minnesota. Their flesh is delicious and their food habits beneficial, and it is to the interest of sportsmen and farmers alike to have their numbers increased by propagation on preserves and farms.

**Other Species.** The *Canada grouse*, also called *spruce partridge* and *fool hen*, which was once common in Michigan, the Adirondacks of New York, and Northern New England, is still found in dense coniferous forests, but it is nowhere a really common bird, although it ranges from New England and New York to Alaska.

*Franklin's grouse* and the *dusky grouse* of Northwestern United States and Canada are called *fool hens*, for they are so unsuspicious that they stand curiously watching an approaching enemy and so are easily caught or shot. The *sage grouse*, largest of the family, is a bird of the Western plains.

The *heath hen* is the Eastern representative of the prairie chicken. It was formerly a common bird along the Atlantic coast from Massachusetts to Virginia. It is now found only on the island of Martha's Vineyard, and it will soon become extinct unless it is rigidly protected.

D.L.

**Scientific Names.** Grouse belong to the subfamily *Tetraoninae* of the family *Tetraonidae*. The ruffed grouse is *Bonasa umbellus*; the prairie chicken, *Tympanuchus americanus*.

**GRUB.** See LARVA.

**GRUBER**, EBERHARD, founder of the Amana Society, See AMANA.

**GRUNDY**, MRS., a name originating in an old play called *Speed the Plow*. One of the characters, afraid of what the social world may think of the actions of his friends and himself, constantly repeats, "What will Mrs. Grundy say?" Mrs. Grundy has therefore become the personification of society's opinions. An old poem is often quoted:

They eat, and drink, and scheme, and plod,  
They go to church on Sunday;  
And many are afraid of God,  
And more of Mrs. Grundy.

**GRUNT**, the common name of a large family of fish, nearly all species of which live in warm ocean waters and feed on other fish. The name refers to the grunting sounds made by these fish when taken from the water. Among American species, one of the most important for food is the *pigfish*, or *sailor's choice*, found on the Atlantic and Gulf coasts of the United States from Long Island to the mouth of the

Rio Grande. It grows to be a foot or more in length, and is light blue above and silvery below, with blue and brownish markings on the sides. It is popular in the South as a pan fish.

L.H.

**Scientific Names.** The pigfish is *Orthopristis chrysopterus*. Other members of the family include the margeate fish, *Haemulon album*; the gray grunt, *Haemulon macrostomum*; the red-mouth grunt, *Bathygymna rimator*; and the pompon, *Anisotremus surinamensis*.

**GRUNTING OX.** See YAK.

**GUADALAJARA**, *gwah thah lah hah' rah*. See MEXICO (Principal Cities).

**GUADALQUIVER**, *gwah dal kwiv' ur*, RIVER. See SPAIN (Rivers and Lakes).

**GUADALUPE HIDALGO**, *gwah thah loo' pa e thahl' go*, TREATY OF, a compact between the United States and Mexico, entered into on February 2, 1848, at the close of the Mexican War. The negotiations were conducted at Guadalupe Hidalgo, a small town three and one-half miles north of the City of Mexico. By the terms of this treaty, the United States secured the territory comprising the present states of California, Nevada, and Utah, most of the present New Mexico and Arizona, and part of Colorado and Wyoming. The Rio Grande was agreed upon as the boundary between Texas and Mexico. In addition, the United States agreed to pay Mexico \$15,000,000 and to assume the payment of all claims, not exceeding \$3,250,000, held by American citizens against Mexico, which had originated prior to the date of the treaty. See MEXICAN WAR; GADSDEN PURCHASE.

**GUADALUPE MOUNTAINS.** See CARLSBAD CAVERN.

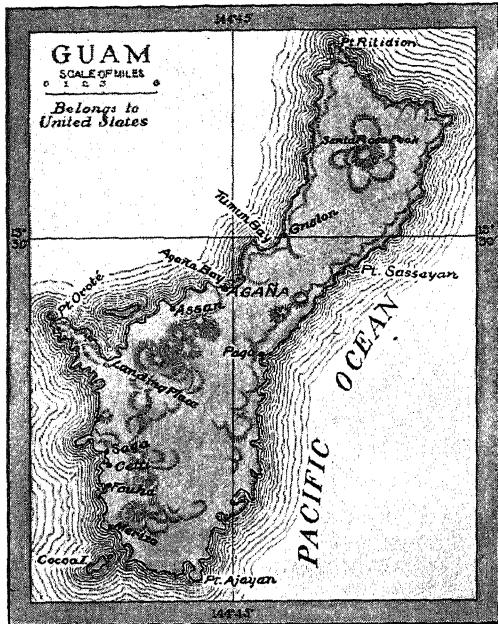
**GUADELOUPE**, *gaw da loop'*, consists of two islands of the West Indies. The larger is Guadeloupe proper, or Basse-Terre; the other, Grande-Terre. Together they form one of the principal French colonies, noted for its fine quality of cocoa, sugar, and coffee. It has an area of 619 square miles. The climate is hot and not very healthful; the mean temperature is about 78°. Earthquakes and hurricanes are frequent.

The islands form one of the eighty-six governmental divisions of France, and are represented in the French government by one Senator and two Deputies. Small, unimportant adjacent islands to the number of five are under the rule of the colony. The chief products include sugar, cocoa, coffee, bananas, tobacco, and sweet potatoes. The chief seaport is Pointe-à-Pitre, in Grande-Terre. It has a population of 28,000, the total population of the colony being over 230,000. The islands were captured and recaptured by the French and the English during their various wars, but by the treaty of peace which closed the Napoleonic era, they were finally ceded to the French.

**GUADIANA**, *gwah the ah' nah*, RIVER. See SPAIN (Rivers and Lakes).

**GUAM**, *gwahn*, an island belonging to the United States, is one of the group of Mariana Islands, formerly the Ladrones. Guam is located in a remote spot in the Pacific Ocean, 1,500 miles east of Manila. It is about 210 square miles in extent, and has been described as the smallest and most isolated possession of the United States. Magellan first discovered it in 1521, but it was not taken over as a Spanish possession until 1561. By the Treaty of Paris, in 1898, closing the Spanish-American War, it was ceded by Spain to the United States. Since that time the island has made rapid progress. It is a regular port of call between America and the Philippines, and has become of special value to the United States since the opening of the Panama Canal, as it is a naval station of importance.

A freight line has been established to export its products. The island raises copra, spices, pineapples, cotton, coffee, sugar, tobacco, and sweet potatoes. Agana, the capital, is becoming Americanized, and has elementary



GUAM

Destined to become a naval stronghold of the United States in mid-Pacific waters.

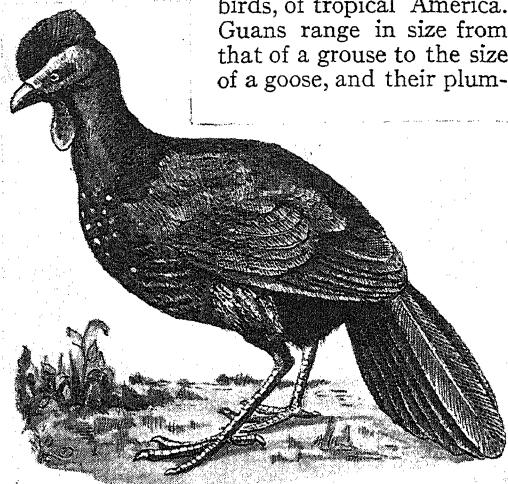
English schools. An agricultural experiment station has been established by the Federal government. The temperature is mild, and the climate comparatively healthful.

The chief executive is an officer of the navy, who is appointed by the President of the United States and who holds the title of governor. The total population of the island is

16,940 (1926), and is composed largely of natives, who are above the average in intelligence.

A powerful government radio station is located on the island, and there is also a cable station.

**GUAN**, *gwahn*, one of a subfamily of game birds related to the curassows, or turkey-like birds, of tropical America. Guans range in size from that of a grouse to the size of a goose, and their plum-



THE GUAN

age is greenish-black mixed with white and brown. Their tails are long, and most species have crests on the head. The throat is usually featherless. One species, the *chachalaca*, is found as far north as Texas. This bird lives in large flocks and is easily domesticated. From Mexico southward, it is considered by the native Indians a table delicacy, much as is the partridge in more northern latitudes.

D.L.

**Scientific Names.** Guans belong to the subfamily *Penelopinae* of the family *Cracidae*. The chachalaca is *Ortalis vetula*.

**GUANACO**, *gwah nah' ko*, one of the two wild species of woolbearing animals of South America that belong to the camel family, the other, and smaller, species being the vicuña. The llama and alpaca are domesticated varieties of the guanaco. This animal is an attractive appearing creature, with a long, graceful neck and straight, flat back. A fully matured male is about four feet high. The hair is soft and thick, pale reddish in color, and almost white on the under parts. The guanaco is found in all the temperate regions of South America, but is most numerous in Patagonia. Its flesh is eaten by the natives, and its skin is used for clothing and tents.

W.N.H.

**Scientific Name.** The guanaco belongs to the family *Camelidae*. Its scientific name is *Lama huanacus*.

**Related Subjects.** The reader is referred to the articles listed below:

Alpaca

Camel

Llama

Vicuña



Photo: Visual Education Service

## A GUANO ISLAND BELONGING TO PERU

The scene is supposed to be on the island of Lobos de Tierra, about fifty miles off the coast of Peru.

**GUANAHANI**, *gwah nah hah' ne*, ISLAND. See BAHAMA ISLANDS.

**GUANAJUATO**, *gwah nah hwah' toh*. See MEXICO (Principal Cities).

**GUANO**, *gwah' no*, a Spanish word applied to deposits of the excrement of sea birds, such as pelicans, penguins, petrels, cormorants, and gannets, which live in large colonies. When thoroughly decomposed, these deposits form a valuable fertilizer, possessing large proportions of nitrate and phosphate compounds. The islands off the coast of Peru were long the chief source of the supply, but the deposits there are becoming exhausted, and guano is being supplanted by cheaper fertilizers. The deposits found on the Chincha Islands at one time covered the surface to a depth of more than 100 feet. In 1840 the Peruvian government began exporting guano, and the supply continued plentiful for thirty years. In the Galapagos Islands of Ecuador, there are other valuable deposits. Guano has also been found in many other parts of the world, but it seldom occurs in quantities sufficient to pay for collection at distances of more than twenty degrees north or south of the equator.

No definite rule can be laid down as to what kind of soil is most benefited by the use of guano. If careful analysis shows that the soil is weak in nitrates and phosphates, guano may be used to supply the need. It should always

be thoroughly mixed with four or five times its bulk of fine soil, before being applied. See FERTILIZER.

**GUARANI**. See PARAGUAY (The People).

**GUARANTOR**. See GUARANTY, below.

**GUARANTY**, *gair' an te*, an obligation whereby one person contracts to pay the debt of another in case the latter defaults in payment. The *guaranior* is the person making the promise; the person in whose interest the promise is made is the *principal*; and the *guarantee* is the person to whom the promise is made. A provision is made in the statute of frauds that no person shall be liable for the debt, default, or failure of another unless a written agreement is signed by the guarantor, or his authorized agent, for this purpose. In the event of the guarantor's being called on to pay the debt, an indemnity or reimbursement against loss is usually provided for by bond. If there are a number of guarantors, and they are obliged to pay the debt, each must pay his agreed proportion.

**GUARDAFUI**, *gwahr dah fwe'*, a cape which has the distinction of being the most westerly point on the coast of Africa. See AFRICA, map.

**GUARDIAN**, *gahr' dih an*, in law, the legal representative and custodian of infants—that is, persons under the age of twenty-one. Parents themselves are called *guardians by nature*. The courts appoint guardians when

necessary. A guardian is not permitted to reap any benefit from his ward's estate, but must account for all profits. He can invest the money of his ward in real estate only by order of the court, and he can convert real estate into personal property only by a similar order. If he spends more than the interest and profits of the estate in the maintenance and education of the ward, without permission of the court, he may be held liable for the principal thus consumed.

A ward owes obedience to his guardian, which a court will aid the guardian in enforcing. A ward cannot marry without the consent of his guardian. He could not bring an action at law against his guardian, but might file a bill in court calling him to account. At the age of about fourteen, the ward is usually entitled to choose a guardian, his choice being subject to the rejection of the court, for good reason, when he is entitled to choose again. See *WARD (In Law); HUSBAND AND WIFE.*

**GUARNERI**, *gwahr na' re*, GIUSEPPE. See *VIOLIN.*

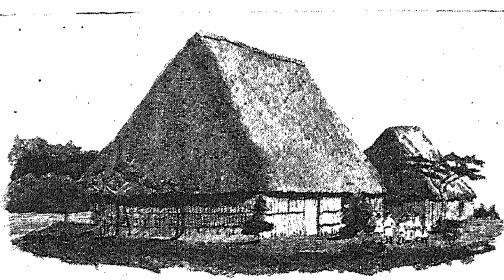
**GUATEMALA**, *gwah tay mah' lah*, a picturesque and beautiful country, the second in size but most important of the republics of Central America (which see). It lies wholly in the torrid zone, from about  $13^{\circ}$  to  $18^{\circ}$  north of the equator, between Mexico on the north and west, and British Honduras, the Gulf of Honduras, and Salvador on the east. On the south is the Pacific Ocean. Guatemala is exactly south of lines drawn southward from Saint Louis and New Orleans. Covering an area

of 48,290 square miles, it is slightly larger than the state of New York. [For location, see *NORTH AMERICA* (colored map).]

The name Guatemala is probably of Aztec origin; some authorities translate it as *Land of the Eagle* or *Land of Forest*, while others connect it with the volcano Agua, interpreting it, *Mountain vomiting water*.

**The People.** About sixty per cent of the people are pure Indians, descendants of the Mayas, a highly developed race whose origin has not as yet been determined; it is thought they are allied to the Toltecs or Aztecs of Mexico (see *AZTEC; MAYA*). The Guatemala Indians still maintain their identity as a dis-

tinct race, a fact not true of any other Central American country. The remainder are mostly half-castes. There are a number of Spanish-



A SCHOOLHOUSE IN GUATEMALA

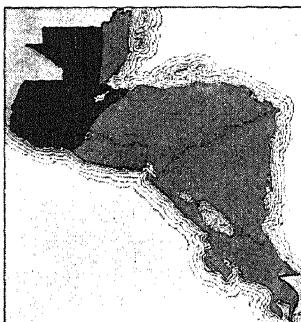
The walls are built of upright poles fastened together with ropes made by women from hemp or leaves. The steep roofs are thatched. The single room of such a building usually has no floor. Only about one person in four in the country can read and write.

Americans, Germans, and other foreigners, living chiefly in the cities, but the foreign population does not greatly exceed 12,000. Immigration is encouraged by free distribution of uncultivated lands. The total population is about 2,454,000. Most of the people live on the plateaus along the Pacific coast, and here are to be found the most populous towns.

Guatemala has one of the best systems of education in the Central American states, in spite of the fact that three-fourths of the people are illiterate. Education is free and compulsory. A university was established in 1918, and there are schools of music, art, pharmacy, and sciences. The prevailing religion is Roman Catholic, but all creeds are tolerated. Spanish is very generally spoken.

**Climate, Land, and Products.** Guatemala is mountainous and hilly in most places. On the northeast coast is a hot, marshy, forested tract, still largely unexplored. It is a section partly of jungles, but there are also dense forests of valuable mahogany, with magnificent orchids and rare and brilliantly colored birds. Bamboo, coco palms, chicle, and rubber trees grow wild. Sugar cane, tobacco, cotton, cacao, and tropical fruits are cultivated in the lowlands; bananas are grown on the Caribbean and Pacific coast lands.

The central portion is a high plateau surrounded by mountain ranges attaining an elevation of 11,000 feet at the highest point. In that section, on plains from 2,000 to 6,000 feet above sea level, the climate is temperate and healthful, with sufficient rain for agriculture. Coffee is the principal product of the country and is raised chiefly in these temperate regions. At higher altitudes, wheat, potatoes, apples, and corn are the principal crops. Above 10,600 feet, in the colder regions, there is no farming, but there is some mountain grazing.



LOCATION MAP



Photo: Visual Education Service

**MARKET PLACE**  
Such a section may be seen in almost every town in the country.



Photo: Fotograms

**A View of the City of Guatemala.** Seen from an airplane at about three hundred feet elevation The cathedral is the most imposing building in the town.

2975

The peonage system prevails to a large extent on the Guatemala plantations. When an Indian laborer contracts himself to an employer, he cannot leave the employer's service until he has completed the period for which he has agreed to work, and repaid the money which he may have borrowed from his patron. Due to the fact that most of the Indians have contracted debts to their employers, it simply means that they are tied to the land in much the same way as were the serfs of the Middle Ages. The average wage is from two to three pesos a day, or from five to eight cents in United States money.

In the mountains bordering the plateau on the south are numerous volcanoes, most of them extinct. Notable among them is the famous Agua, one of the highest in Central America, its height being estimated at 12,300 to 13,500 feet. It received its name from the destruction of the City of Guatemala, in 1541, by a flood from the volcano. The city was buried under great volumes of water and large stones.

Rivers on the Atlantic slope, though fairly long, are of little use as highways, except Motagua, which is navigable for 100 miles, and Rio Dulce, which connects Lake Izabal with the ocean. Those on the Pacific slope dash in torrents down steep slopes to a narrow plain on the coast. There are numerous lakes, those in the mountains being very beautiful. Lake Izabal, in Northeastern Guatemala, is navigated by steamers. Lake Peten, in the north, is the largest. All these waters are well stocked with fish, but alligators and serpents inhabit the forests and waters, making fishing a dangerous industry.

Silver, gold, copper, iron, zinc, and lead mines are worked to some extent, and the mining industry is encouraged. Marble is abundant.

**Transportation and Commerce.** As most of the important industries in Guatemala are owned by German and American companies, so also are the more than 500 miles of railway. Outside of the railways, most of the traffic of the republic is made in motor trucks and on mule-back, and although there are a few good roads and many bridges, transpor-

tation facilities in the mountains are still inadequate.

**Government and History.** The government of Guatemala is directed by a President whose term is six years, and by a Cabinet, a National Assembly elected for four years, and a Council of State. A Constitution, adopted in 1879 and four times modified, is the basic law of the republic. For administration purposes, the country is divided into twenty-two departments, or small states.

The history of Guatemala is practically a part of that of all Central America. The country was formerly Spanish territory, became free in 1821, and for a short time belonged to Mexico. It joined with the other states in the Confederation of Central America, but has been independent since 1838.

For thirty years Guatemala was dominated by Rafael Carrera; he ruled until his death in 1865. From that date until 1885, Barrios, a Liberal, held power, after which Manuel Estrada was president for a long period—until his overthrow in 1920.

Guatemala has been disturbed by political revolutions less than any of its neighbors except Costa Rica, due to the fact that the Indians are extremely docile and are particularly respectful to the authorities.

Archaeologists and scientists find a rich field for exploration in Guatemala, as well as in other Central American countries, for there are many relics of the Maya civilization. The ruins at Quirigua, consisting of numerous monoliths, sacrificial stones, and other sandstone relics decorated with figures and hieroglyphics, indicate the presence of an ancient and highly developed civilization.

**The Cities.** The second largest city, with 30,000 population is Quezaltinango. On the Caribbean coast are Puerto Barrios, the banana port, and Livingston. San José and Champerico, on the Pacific, export coffee.

**Guatemala City, or Guatema la Nueva,** sometimes also called Santiago de Guatemala, is the capital of the republic and its commercial center; its population is 116,000. The city is situated in a fertile plain and enjoys a delightful climate. It is eighty-five miles from the Pacific coast and about 5,000 feet above the sea.



Photo: U & U  
A CHARCOAL DEALER

The city has three times been destroyed by earthquakes, the last dreadful convulsion in 1917 shattering great churches which had stood for 100 years, besides destroying most of the homes and rendering 80,000 homeless. The city has recovered since then from the effects of that calamity and is almost completely reconstructed. The streets are wide and straight, the houses comfortable. There are magnificent promenades, notably the Paseo de la Reforma; La Aurora Park, public gardens, theaters, public monuments, a university, schools of primary and secondary education, telephone systems, libraries, Catholic and Protestant churches, large stores, hotels, banks, etc. Several daily and weekly newspapers are published.

A.R.

**GUAVA**, *gwah' vah*, a small tree or shrub at one time known only in tropical Asia, but now cultivated and a source of income in the

cultivated than the lemon guava, being more acid. The *strawberry guava*, bearing a small, claret-colored fruit, is excellent for preserves.

B.M.D.

**Scientific Names.** The guavas belong to the myrtle family, *Myrtaceae*. The lemon guava is *Psidium guajava*; the strawberry guava is *P. cattleyanum*.

**GUAVIARE RIVER.** See ORINOCO RIVER. **GUAYAQUIL**, *gwy ah keel'*. See ECUADOR (The Cities).

**GUAYULE.** See RUBBER AND RUBBER MANUFACTURE.

**GUDRUN.** See SIGURD.

**GUELDER-ROSE**, *gel' dur roze*. See SNOW-BALL.

**GUELPHS AND GHIBELLINES**, *gwelfs, gib' el inz*, the names of two great Italian political factions, in the thirteenth and fourteenth centuries. These terms are corruptions of the German *Welf* and *Waiblingen*, party designations, said to have been used first in 1140 as battle cries in the Battle of Weinsberg between the Welfs of Bavaria and the imperial line of Hohenstaufen, to whom belonged the estate of Waiblingen. In Italy, the names acquired a different meaning: the Guelphs were the Italian patriotic party, which demanded an Italy freed from German interference; the Ghibellines, the imperial party, which supported the domination of the German emperors in Italy. These factions came into prominence in the Lombard League of 1167.

A full account of the quarrels of Guelphs and Ghibellines would embrace the history of medieval Italy. After the fall of the Hohenstaufens (which see), the Ghibellines became the representatives of the aristocracy, and the Guelphs were the partisans of democracy and liberty. The Guelphs are now represented by the ducal family of Brunswick and the royal family of England (now the House of Windsor).

**GUERICKE**, *ga'rik e*, OTTO VON. See BAROMETER.

**GUERIN, JULES.** See LANDSCAPE GARDENING.

**GUERNSEY**, *gurn' zie*, one of the Channel Islands (which see), the original home of the breed of cattle known as the Guernsey.

**GUERNSEY COWS.** See DAIRYING (The Herd).

**GUERRIÈRE**, *gair e air'*, a British ship defeated by the *Constitution* (which see).

**GUEST**, EGDR A. (1881- ), a writer of humorous and serious verse. His poems are widely read and enjoyed for their simple treatment of the joys and sorrows of everyday living. He is the self-styled "Poet of the Plain People." Reverence for home, God, and America, and the inevitable fruits of honesty and industry are his themes.

Guest was born in Birmingham, England. At the age of ten he emigrated to the United



Photo: Visual Education Service

#### FRUIT OF THE GUAVA

Southern United States. It is esteemed for its edible fruit, especially valuable for jellies and preserves. The species most commonly grown in Florida and the Indies is the *lemon guava*. It grows about twenty feet high, and the numerous branches bear blunt leaves two or three inches long. Following fragrant white flowers the fruits appear—roundish or oblong, smooth, yellow, and about the size of a hen's egg. The firm, flesh-colored, sweetish-sour pulp is filled with horny seeds. The thin, brittle rind, stewed with milk, makes a marmalade. The fruit is also eaten sliced, with cream, is used in pastry, and is made into a jam called *guava cheese*.

Florida leads in the production of the lemon guava, which is also grown in Southern California. A *red guava*, bearing a beautiful, red-fleshed fruit, grows in the Indies, but is less

States with his parents, and was educated in the schools of Detroit, Mich. Since 1895 he has been associated with the Detroit *Free Press*, where he served successively as office boy, exchange editor, police reporter, and staff poet. For several years he has conducted a column of verse and humorous sketches in the *Free Press*. His poetry is syndicated in newspapers throughout the United States.



Photo: U &amp; U

EDGAR A. GUEST

*Done, Poems of Daily Life, All That Matters, Rhymes of Childhood, Harbor Lights of Home, and You Can't Live Your Own Life* (prose), published in 1928.

#### GUGGENHEIM MEMORIAL FOUNDATION. See EDUCATIONAL FOUNDATIONS.

**GUIANA**, *ge ah'-nah*, a name applied to three colonies of South America, owned respectively by the British, Dutch, and French. For description, see in these volumes BRITISH GUIANA, DUTCH GUIANA, AND FRENCH GUIANA.

**GUIDO OF AREZZO**, *ah ret'so* (about 990-about 1050), is called by many the father of modern music. He invented, or for the first time systematically used, the lines of the staff and the intervals between them, and thus fixed the principle of modern musical notation. He also introduced the names of the first six notes of the scale—*ut, re, mi, fa, sol, la*; these are



MATER DOLOROSA, FROM THE PAINTING BY GUIDO RENI

the first syllables of six lines of a hymn addressed to Saint John the Baptist. Later, *do* was substituted for *ut*, as being more euphonious.

Guido was a Benedictine monk, and little is known of his life. The fame of his musical invention drew the attention of Popes Benedict VIII and John XIX, who invited him to Rome and did much to popularize the new system. He left writings explaining his musical doctrines. See Music.

**GUIDO RENI**, *gwe' doh ra' ne* (1575-1642), an Italian painter, generally known as GUIDO. He was one of the most eminent artists of the Eclectic School, founded in Bologna by the Carracci (which see). While a student at their academy, he aroused the jealousy of his teachers through his superior work, and left them to become an independent artist. At



GUIDO RENI

first he imitated various painters, but eventually adopted a style of his own, the outstanding qualities of which were idealistic refinement and poetic coloring. In his later pictures he turned from a warm golden tone to a pale silvery gray, a manner typifying the decline into insipidity which befell the Bolognese school. Between 1602 and 1622, Guido spent most of his time in Rome, where he enjoyed the patronage of Pope Paul V. The splendid prosperity of his later years, in Bologna, was ended by his dissipation and gambling, which cheapened his art and, without any doubt, hastened his death.

**Summary of His Work.** Guido's master-piece of his early period is the *Aurora*, a splendidly poetical example of his art, idealistic and refined, but lacking in force and originality. It adorns a ceiling of the Rospigliosi Palace, Rome, and is accounted one of the twelve greatest paintings (see PAINTING). Typical of his middle period are his *Massacre of the Innocents*, in Bologna; *Fortuna*, in Rome; and *Rape of Helen* and *Four Episodes from the Myth of Hercules*, both in the Louvre. Famous among his pictures in the silver-gray method is the *Nativity*, in Vienna. He also executed a few portrait studies, of which the best known is the so-called *Beatrice Cenci*, a treasure of the Barberini Palace, Rome. This, too, is counted among the twelve greatest paintings. Reproduced on page 2978 is his *Mater Dolorosa*.

**GUILD, gild.** Perhaps the most interesting phase of the study of history is to observe how the tendencies which man displays to-day were shown in earlier times. There is no more striking example of an institution of the past resembling those of the present than the guild of the Middle Ages. In the present age people form societies for every conceivable purpose, for business, for pleasure, for religion, for politics, for mutual protection or advancement, for advocating or protesting against legislation. Considering the simpler state of political and social organization which prevailed at the time, the guilds were no less varied. We know them best as societies of merchants and workmen, but there were also religious guilds, military guilds, and social guilds.

**Merchants' Guilds.** These organizations were more important in England than elsewhere; they flourished from the twelfth to the fourteenth century. The members of any guild were usually all residents of the same town, and included both merchants who bought and sold and artisans who made their own products. The guild was often granted a monopoly of the retail trade in its town, with the privilege of taxing outsiders who brought in goods. Anyone could join it who was willing to share in the taxes of the town. So we see in this type of guild the seed of the policies of several modern organizations of widely different purpose, such as societies to promote protective tariffs, labor unions to resist the immigration of foreign workmen, and civic leagues of business men and taxpayers.

**Craft Guilds.** In the days of the guilds, the manufacturers were skilled workmen as well as owners of the goods which they produced. In each town, all those who shared in a certain craft or trade, such as weaving, or gold-working, banded together to advance the standard of their work. The members were divided into three classes, according to their skill. First were the *masters*, who alone were entitled to buy materials and sell manufactured goods. They bought and sold at prices fixed by the organization, and their establishments were under the supervision of the guild, so that no

inferior product might be turned out. The second grade was composed of *journeymen*, who received wages from the masters and lived with them. When their education was completed, each was required to construct a *masterpiece* before being declared a master, just



GUILD HOUSE OF THE YORK MERCHANTS COMPANY  
[From an old English print.]

as a candidate for the degree of Master of Arts in a modern university must write a *thesis*. The beginners at the craft were *apprentices*; for their work they received board and lodging.

The craft guilds were most important in the fourteenth and fifteenth centuries, but a few of them survived nearly to the nineteenth century. When these guilds were at the height of their influence, it became more difficult for journeymen to advance to the grade of master, and the journeymen formed guilds of their own, which were the forerunners of the modern labor organizations. The original craft guilds, on the other hand, bear resemblance to present-day associations of competing business men.

**GILDER, gil' dur**, a standard coin of Holland. See MONEY (Foreign Monetary Standards).

**GUILFORD, gil' ford, COURTHOUSE, BAT-TLE OF.** See REVOLUTIONARY WAR IN AMERICA.

**GUILLEMOT, gil' e mot**, the name applied to certain species of sea birds belonging to the auk family. They are birds of northern waters and have much the same habits as the true auks (see AUK). The *common*, or *foolish*, *auk*, so called because it will suffer capture rather than leave the cliffs on which it breeds, abounds in the Arctic regions of both hemispheres and in the colder parts of the temperate zones. Colonies of these birds congregate on steep edges, each female laying one large thick-

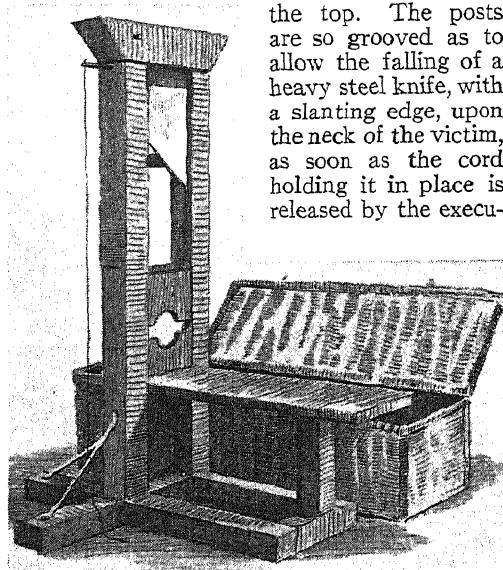
shelled egg on the bare rock. The foolish guillemot is also called *murre*, though this name, sometimes qualified, belongs to several other species. The *black guillemot*, or *sea pigeon*, frequents both coasts of the North Atlantic. It lays two or three eggs, depositing them in a nest of pebbles when the rock is too moist. The *thick-billed guillemot* inhabits the same localities as the common species. Both of these forms have subspecies in the North Pacific.

D.L.

**Scientific Names.** The guillemots belong to the family *Alcidae*. The common species is *Uria troile*; the black, *Cephus grylle*; the thick-billed, *Uria lomvia*.

**GUILLOTINE**, *gil' o-teen*, a device for beheading persons, introduced into France during the Revolution in 1792, on the suggestion of Dr. Joseph Guillotin, after whom it was named.

The instrument consists of two upright posts, with a crossbeam at the top. The posts are so grooved as to allow the falling of a heavy steel knife, with a slanting edge, upon the neck of the victim, as soon as the cord holding it in place is released by the execu-



THE GUILLOTINE

tioner. The guillotine is still the means employed in capital punishment in France.

The device is believed to have originated in Persia, but the date is unknown. Various countries have employed modifications of it in centuries past. In the thirteenth century, Italy used for decapitations a similar device called the *mannaia*; in Scotland, such an instrument was known as the *maiden*.

For a description of the use of the guillotine during the French Revolution, when hundreds of persons were cruelly put to death, see that title in these volumes. In Dickens' *Tale of Two Cities*, the chapter "Knitting" gives a realistic word picture of the instrument and of the times.

**GUILMANT**, *geel mah N'*, FELIX ALEXANDRE (1837-1911), a French organist and

composer, whose influence upon organ music extended to many lands. He was a tireless worker. Indeed, so fast did he work, and so well also, that during one of his American tours, organ pieces were written en route from New York to Philadelphia and completed before his arrival. His *Fugue in D Major* was written in a single evening, and his *Second Meditation*, one morning before breakfast.

At the age of seven he began to compose music extemporaneously, and worked ceaselessly for twenty years before he developed his art to the high standard for which he became distinguished later. He was organist in many famous churches in France, and in 1896 accepted a professorship at the Paris Conservatory. Later, he made several successful concert tours in Europe and America. Great as were his performances of standard works, he will be remembered for his own marvelous compositions. In his extemporaneous playing he had no equal.

**His Chief Works.** Guilmant composed eight organ sonatas, three masses, and hundreds of organ pieces. His *Liturgical Organist*, of twelve volumes, contains a wealth of material for the church service. He also edited an *Historical Organ Book*, containing examples of all the schools of organ playing.

**GUILT OFFERING.** See SACRIFICE.

**GUINEA**, *gin' ie*, a name applied to portions of the west coast of Africa, bordering on the Gulf of Guinea and the Atlantic Ocean. Although the boundaries have never been clearly defined, it is generally understood that Guinea extends from the Gambia River, just south of the westernmost extremity of the continent, eastward along the gulf to the eastern boundary of Cameroon. Sovereignty is in the hands of Great Britain, France, Spain, and Portugal. In the midst of these colonies and protectorates is the republic of Liberia.

The origin of the name is unknown, but it is probably derived from *Ghinea*, or *Ginnie*, applied to a town and kingdom in the interior, on the Niger River, which was a commercial center in the eighth century. The name did not come into general use until the fifteenth century.

**GUINEA**, an old English coin, so named because first coined of gold from Guinea in 1663, during the reign of Charles II. Its unit value is twenty-one shillings, or, in American and Canadian money, \$5.04. It was the principal English coin until 1817, when the sovereign was introduced (see SOVEREIGN). Until recently it was customary to estimate professional fees, such as the charges of doctors and dentists, and charitable subscriptions, in guineas. In England to-day, goods are often priced in guineas, but such coins are not in circulation. See MONEY (Foreign Monetary Standards).

In literature there is frequent reference to this coin. Burns says:

The rank is but the guinea's stamp,  
The man's the gowd for a' that.

**GUINEA FOWL**, one of a group of birds which originated in Africa and are closely related to the pheasants. Domestic guinea fowl, which are quarrelsome and hard to raise, are unpopular because of their continued harsh cries. Their flesh, however, is esteemed as a delicacy, and commands a good market price. Their eggs, which are small, spotted, and have a strong, thick shell, are also in demand. These fowls have dark, slate-colored feathers, with regularly arranged white spots. D.L.

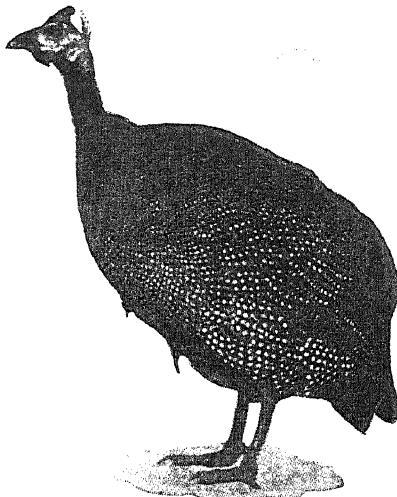
**Classification.** Some naturalists place guinea fowls in a separate family, *Numididae*; others consider them a subdivision of *Phasianidae*.

**GUINEA MONEY.** See **MONEY** (Unusual Terms Applied to Money).

**GUINEA PIG**, a little animal more correctly called the *cavy*, about six inches long. It makes an interesting pet for children and contributes largely to medical science. In their manner of life and in their food, guinea pigs are much like the rabbits. Several colors are characteristic of these animals, the varieties being known as the *tortoise shells*, the *red*, *brown*, and *white*. They have small ears and no tails, and the sound they make is like a shrill whistle. Because they are naturally clean in habit and are strong, they are much used in bacteriological laboratories for experimental purposes. They will rest quietly in the hand while serum is being injected, and will resume feeding as soon as returned to the cage, apparently with only trivial discomfort. They are also used in vivisection. Antiseptic precautions are used, and all severe operations are performed under anesthesia; no animal is permitted to undergo needless suffering. See **VIVISECTION**. W.N.H.

**Scientific Name.** The guinea pig belongs to the family *Caviidae*. It is believed to be a domesticated form of the cavy, whose scientific name is *Cavia culteri*. Its own scientific name is *Cavia aperea*.

**GUINEVERE**, *gwin' e vere*. See **LANCELOT**; **ARTHUR, KING**.



GUINEA FOWL



GUINEA PIGS

Photo: U &amp; U

ous of the duke's popularity and influence, caused him to be assassinated in 1588. After the death of Henry I of Lorraine, the Catholic forces were commanded by his brother Charles, Duke of Mayenne. Charles was defeated at Arques and Ivry by Henry of Navarre (Henry IV of France), but continued the struggle until 1596, when he made peace with the king. In 1675 the direct line of the Dukes of Guise of the House of Lorraine became extinct, and the family estates passed to their nearest kin, the House of Condé. See **FRANCE** (History).

**GUITAR**, *git ahr'*, a stringed musical instrument with a hollow body and a neck, somewhat resembling the violin. The woods commonly used for the sides are maple, ash, and cherry; hardwoods, such as ebony, beech, or pear, are employed for the neck and finger board; the bridge is of ebony. Horizontal ridges, or frets, are found on the neck, to show where the strings are to be pressed. The modern, or Spanish, guitar, has six strings, the three highest made of gut and the other three of silk spun over with silver. The strings are plucked by the fingers of the right hand, and the fingering is done with the left. The thumb sounds the deepest strings; the first, second, and third fingers

**GUISCARD**, *gees kahr'*, ROBERT. See **NORMANS**.

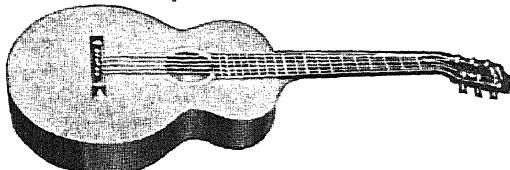
**GUISE**, *gi eez'*, a noble French family, the most famous branch of the House of Lorraine, several members of which had a conspicuous part in French history. The family acquired

great political influence on the succession of the French king, Francis II, for his wife, Mary Queen of Scots, was a granddaughter of Claude of Lorraine (1496-1550), the first Duke of Guise. François of Lorraine (1519-1563), second Duke of Guise, was the leader of the Catholic party during the religious wars that devastated France in the reign of Charles IX. After winning several victories, he was assassinated while preparing for the siege of Orleans. His son, Henry I of Lorraine (1550-1588), third Duke of Guise, led the armies of the Catholics against the Huguenots (Protestants) in the reign of Henry III. The latter, jealous

of the duke's popularity and influence, caused him to be assassinated in 1588. After the death of Henry I of Lorraine, the Catholic forces were commanded by his brother Charles, Duke of Mayenne. Charles was defeated at Arques and Ivry by Henry of Navarre (Henry IV of France), but continued the struggle until 1596, when he made peace with the king. In 1675 the direct line of the Dukes of Guise of the House of Lorraine became extinct, and the family estates passed to their nearest kin, the House of Condé. See **FRANCE** (History).

sound the three highest tones; and the little finger rests on the sounding board.

The guitar originated in Spain, where it is highly esteemed as an instrument to accompany the voice. It is not used in orchestras, but is



THE GUITAR

a favorite with amateurs, who find it easy to play and its notes appealing. Traditionally, it is the instrument used by the tenor in opera, when he is serenading his lady.

**GUITEAU, CHARLES J.** See GARFIELD, JAMES ABRAM.

**GUIZOT, ge zo'**, FRANÇOIS PIERRE GUILLAUME (1787-1874), a French historian and statesman, whose writings and lectures did much for the development of historical study in France. He was born at Nîmes, and in 1805 went to Paris to study law, but took up literature instead. In 1812 he became assistant professor of literature at the Sorbonne, and later in the same institution occupied the chair of modern history. His publicly expressed political opinions led to his enforced resignation. He was elected to the Chamber of Deputies in 1830, and, following the Revolution of the same year, became Minister of the Interior, resigning a few months later.

In 1840 Guizot spent some months in London as French ambassador to England, but was recalled by the king to form a new ministry. He was Prime Minister for the eight years preceding the abdication of Louis Philippe. His arbitrary refusal during this period to make concessions demanded by existing political conditions brought about his political downfall, and after the fall of Louis Philippe he fled to England. See FRANCE (History).

**His Histories.** Upon his retirement from public life, Guizot devoted himself to literary work and produced a *History of the English Revolution*, *General History of Civilization in Europe*, *The History of Civilization in France*, and *The History of France from the Earliest Times to the Year 1789*.

**GULDEN, gool' den**, a standard coin of Austria. See MONEY (Foreign Monetary Standards).

**GULES.** See HERALDRY.

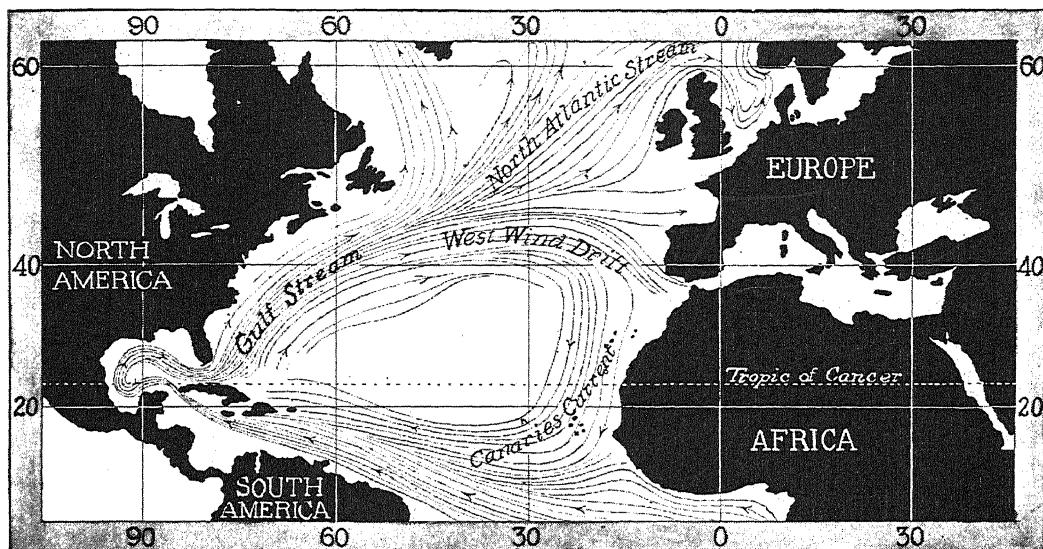
**GULF STREAM**, the most important and the largest of the oceanic currents. It derives its name from the Gulf of Mexico, out of which it flows. It is three thousand times as large as the great Mississippi River, and ten thousand times as large as the Hudson. The Gulf Stream as such has its origin in the heat of the tropical

Gulf of Mexico; the farthest reach of its influence is in the ice floes of the Arctic seas. It flows from the Gulf through the Florida Strait, and northward between the coast of Florida and the Bahama Islands. It follows a course parallel to the coast of the United States, from which it is separated by a narrow strip of cold water, known to sailors as the "cold wall." After flowing past Cape Hatteras, it moves northeastward until it reaches the southern edge of the Newfoundland Banks. Here it loses its identity as a distinct current and becomes merged into the general drift of the warm water which moves from the Atlantic in a northeasterly direction toward the coast of Europe. This part is known as the Gulf Stream drift.

**The Cause of the Gulf Stream.** For a long time it was thought that the wind was the chief cause of ocean currents. More recent study has shown that, in the case of the Gulf Stream at least, other factors are far more powerful. The most generally accepted theory to-day is that the Gulf Stream is the result of the vertical circulation of the ocean, combined with motion due to the rapid rotation of the earth. The depth of ocean waters is very great. When the water is heated in the tropic regions, it rises and is forced away by the cold water of the north which flows in and sinks below. The direction which the currents seek is determined by the motion of the earth and the shape of the land masses, both of shore and ocean bed, against which the water is forced. The general direction of the warm current flowing northward and the cold current flowing southward is toward the right. Thus the warm surface current known as the Gulf Stream flows in a general northeasterly direction.

**Description.** When the Gulf Stream issues from the Gulf of Mexico it forms a well-defined current about fifty miles wide and about 2,000 feet deep, distinguished by its deep blue or indigo color and by its high temperature, which is several degrees above that of the surrounding water. The swiftness of the current diminishes as it progresses. Within the Florida channel it attains an average velocity of sixty-five miles per day; this decreases to fifty-six miles off Charleston, becomes thirty-six to forty-six miles off Nantucket, and twenty-eight miles to the south of Newfoundland Banks. About 300 miles east of Newfoundland, its movement is hardly perceptible.

**Division.** When the Gulf Stream drift approaches the European side of the Atlantic Ocean, it divides into two parts, one stream going southward toward the western coast of Africa, and the other going northward along the western coast of the British Isles. This northern current then breaks into three branches. One branch runs through the strait between the



COURSE OF THE MAIN STREAM AND BRANCHES

Faroe and the Shetland islands, goes northward along the coast of Norway, and enters the Arctic Ocean, where it spreads over a large area. A second branch flows to the west side of Iceland, while a third and small branch goes up the Greenland side of Davis Strait into Baffin Bay.

**Its Influence upon Climate and Navigation.** The mildness of the climate in Northwestern Europe, as compared with the cold experienced in America in the same latitude, has been for a long time attributed entirely to the presence there of the Gulf Stream. Some men of science, however, consider that this influence upon the climate has been exaggerated; that the mildness of winters in these regions is due more to the prevailing southwesterly winds, which bring moisture and heat from the ocean. But it cannot be doubted that the exceptional mildness of these winds is partially due to the great mass of warm water which is brought to the northwestern coast of Europe by the Gulf Stream drift.

Whether its influence upon the climate of Europe be great or small, the Gulf Stream fulfills another very important function. It keeps some of the harbors of Northwestern Europe free from ice all the winter, and permits uninterrupted navigation all the year. Its influence in this respect, even in the Arctic Ocean, is worthy of illustration. In the north of Russia, on the coast of the Arctic, not far removed from the most northern point on the European continent, there is a port which, being under the influence of the Gulf Stream drift, is always free from ice. This is the port of Ekaterina, situated  $68^{\circ}$  N., which has been connected with Leningrad by a railway 700

miles long, built in 1915 during the progress of the World War. This, the most northern port of Russia, is the only one free from ice, and therefore always open to navigation. Archangel, Russia's other northern port, considerably farther south and east, is icebound half of each year.

R.H.W.

[In these volumes, see the article OCEAN (Ocean Currents).]

**GULFWEED.** See ALGAE; SEAWEED.

**GULICK, LUTHER H.** See CAMP FIRE GIRLS.

**GULLET,** the oesophagus. See DIGESTION (The Stomach); ALIMENTARY CANAL.

**GULLIVER'S TRAVELS.** Two centuries ago there was published in London a remarkable book credited to Lemuel Gulliver as author, who declared himself "first a surgeon, then a captain of several ships." The fact which makes the volume remarkable is that it has become one of the most renowned of children's books, yet was written, not by "Gulliver," but by the very learned Jonathan Swift, dean of Saint Patrick's Cathedral in Dublin. It was intended solely as a merciless satire on men high in public life whom Swift disliked; he wrote it "to vex rather than divert the world." The painstaking style, and the text, replete with dates, localities, and weather conditions, gave such a truthful air to the chronicle that even the wholly improbable parts were viewed for a time almost as possibilities. The victims of Swift's satire were at first too engrossed in the narrative to sense its burning invective.

After nearly eighty years, when adults had lost interest in it because its satire had become meaningless with the lapse of time, a Glasgow printer published a children's edition, revising



Photo: Visual Education Service

## WESTERN GULLS

A scene on the coast of California.

and simplifying it so that only the details relevant to the story remained. From that day to the present time, it has been among the juvenile classics. See SWIFT, JONATHAN.

**The Story.** During a voyage of the good ship *Antelope*, the vessel was wrecked, and the only person saved was Dr. Gulliver, the ship's surgeon. After swimming for hours, he reached land, and found himself on the island of Lilliput, among people who were only six inches tall and whose houses and utensils were in proportionate size. These little people he called Lilliputians. After a series of remarkable adventures, he escaped and eventually reached his English home.

On another voyage, he was set ashore by sailors on an island inhabited by a race of mighty giants compared with whom he was a pygmy. The island was Brobdingnag, and he called the people Brobdingnagians. They were "tall as steeple spires, and covered ten yards with every step." To inspect Gulliver, they had to raise him sixty feet by thumb and finger. His recorded experiences were terrifying to him. See illustrations, pages 6963, 6964.

While these two adventures constitute the important part of the book, two other episodes are recorded, but in these, children find only minor interest.

**GULLS**, a subfamily of long-winged birds of the sea, closely related to the terns. Though the ocean is their proper home, they frequent the Great Lakes and other large bodies of inland water, and are familiar to passengers of steamships, which they will follow in great flocks for hours at a time. Swooping down eagerly to the water for food thrown over-

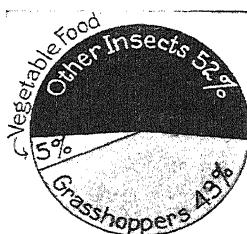
board, they pick it from the surface with their strong hooked bills, unlike the terns, which plunge or dart into the water. Generally speaking, gulls have broader wings, squarer tails, and larger and stockier bodies than terns, and though less graceful in flight, they are better swimmers. The waves of the sea provide a favorite resting place for ocean gulls, and rocky ledges of islands are their nesting resorts. Large colonies may be seen where their breeding places have been left undisturbed. One to five grayish- or greenish-spotted eggs are laid, and the young come into the world with downy plumage. These birds feed on fish and other water animals, offal, and the eggs and young of other birds.

Gulls that frequent harbors and shore waters are useful scavengers, for they devour any kind of refuse that floats. Inland gulls are valuable destroyers of mice and insects. In Salt Lake City there is a monument erected in commemoration of gulls that destroyed millions of crickets in the year 1850.

Adult gulls are generally pearl-gray above and white below, but black, brown, or gray is found in the plumage of some species. The colors vary with the season and age of the birds. Gulls are migratory birds, and breed in regions that are colder than their winter habitations. The North American species include the *ring-billed gull* of the Atlantic coast and Mississippi Valley; the *kittiwake* (which see) of Arctic America; the *great black-*

*backed gull* of the Atlantic coast; *Franklin's gull* of the upper Mississippi Valley, a bird of marshy lakes; and the *laughing*, or *black-headed, gull*, which frequents salt marshes of the Middle and Southern states. Other species are found on the Pacific coast. The large white gull most

commonly seen at Atlantic and Pacific ports, and on inland waters, is the *herring gull*. It is also a well-known bird on the coasts of Europe. See TERNS. D.L.



FOOD OF THE FRANKLIN GULL

ring, *L. argentatus*; Franklin's, *L. franklini*; the great black-backed, *L. marinus*; the laughing, *L. atricilla*. The kittiwake is *Rissa tridactyla*.

**GUM**, the name applied to a variety of widely differing substances of a more or less adhesive nature, which are produced from the sap which flows from certain trees, such as the plum, peach, and cherry. True gum is soluble in water, but not in alcohol. It is without odor and has a faintly spicy taste. Many aromatic substances used in the manufacture of perfumes and incense are classed as gums; gum arabic, a dried exudation from stems and branches of the Senegal acacia in Western Africa, is the best known of these. Cherry-tree gum is used in the manufacture of hats, to stiffen felts. Benzoin and some allied substances are also called gums, but they are more correctly classed as balsams. Gums are used as mixing agents in pharmacy, and as a medium for obtaining cultures in bacteriology. The name is also applied to the sweetened manufactured products popular in America for chewing. G.M.S.

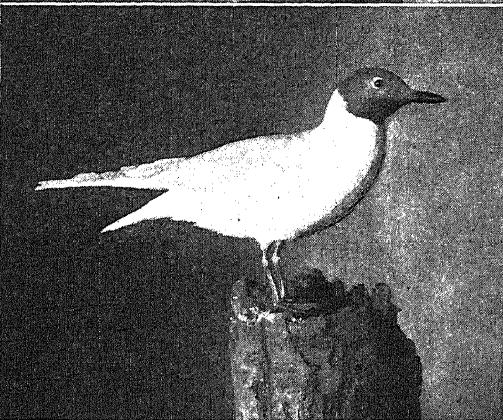
**Related Subjects.** The reader is referred in these volumes to the following articles:

|              |            |            |
|--------------|------------|------------|
| Balsam       | Gum Arabic | Resins     |
| Gum, Chewing | Gum Resins | Tragacanth |

**GUM, CHEWING**, a form of gum resin made pleasing to the taste by sweetening and flavoring. It appears on the market in short sticks at a cent apiece, or in candy-coated ovals. Those who favor gum-chewing claim that it sweetens the breath, and that it aids digestion by increasing the flow of saliva. It is also said to help preserve the teeth to a small extent. Some physicians believe that it is beneficial to chew gum after a heavy meal, but aimless chewing for hours at a time serves no good purpose. Well-bred persons do not chew gum in public.

The chewing-gum industry is an important one in America, but the habit is no longer

peculiarly American. It has extended to every continent, and has even begun to displace the immemorial custom of chewing betel-nuts in



Photos: Visual Education Service

#### GULLS

Above, long-billed gull; below, laughing gull. Ceylon, India, Burma, and the Straits Settlements.

Black-spruce gum resin was first used for chewing gum, but the gum resins of other forest trees are now used, chicle gum from the saponilla tree being employed most extensively. Chicle was first imported into America in an attempt to develop a rubber substitute. These attempts were unsuccessful, but the work with chicle led to the accidental discovery of its value as the base for a chewing gum. The industry was started in 1860, on a capital of \$55.

Chicle is a tough, firm, fragrant gum, nearly white when fresh and clean, but it is rarely pure. The incisions in the trees are made by native workmen, who cut the trees spirally so that the juice runs into cups at the base of the tree. As the sticky sap is being gathered, it catches all the bugs and flying things which come to it before it hardens. Manufacturers of chewing gum try to remove these foreign

substances, but without complete success. The resin is chopped into small pieces, cooked, sweetened, flavored with peppermint, wintergreen, pineapple, or licorice. The "dough" is

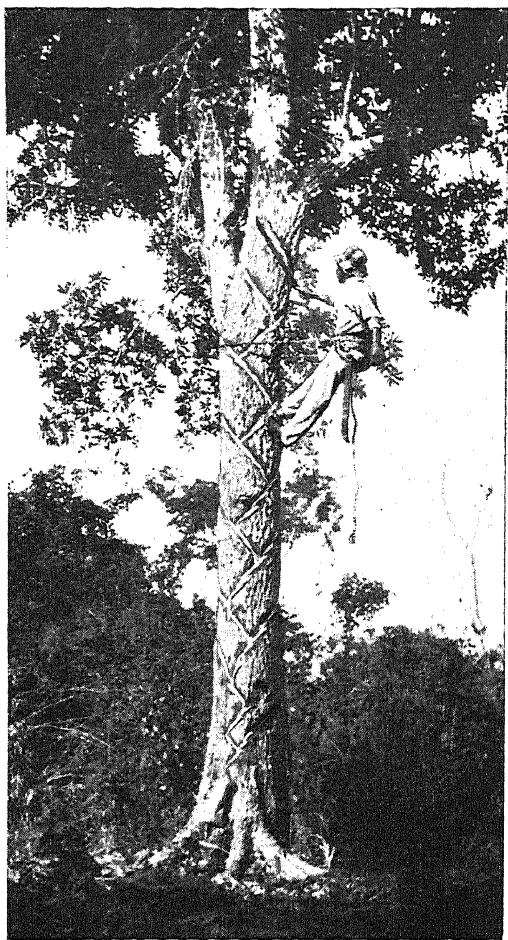


Photo: U &amp; U

## HOW CHICLE IS SECURED

Spiral incisions are made in the tree, and from these the sap flows into a receptacle at the base. The process is known as "bleeding the tree."

then kneaded, rolled, and cut into pieces, all by machinery. See CHICLE.

G.M.S.

**GUM ARABIC**, *air' a bik*, a brittle type of gum obtained chiefly from a tree of the pulse family, which is known botanically as *Acacia Senegal*. In drying, the exuded sap of the tree forms globules, or tears, of a brown or yellow color. The gum is odorless, mucilaginous in taste, and easily dissolves in cold water. The finer varieties are utilized in medicine, the manufacture of confectionery, and in the making of mucilage (which see). Gum arabic is also used to add luster and stiffening to silk. When employed for labels and envelope flaps, it is mixed with glycerin and sugar, to prevent

its becoming stiff enough to crack and fall from the paper. The Anglo-Egyptian Sudan (which see) is the chief source of gum arabic.

G.M.S.

**GUMBO**, another name for the okra, a garden vegetable whose unripe seed pods are used to thicken and flavor soups. Gumbo is also a common name for the soups thus made. See OKRA.

**GUM RESINS**, *rez' inz*, vegetable substances containing resin (see RESINS), which dissolves in alcohol, and gum, which is soluble in water. They also include an essential oil, some coloring matter, and a number of impurities. They are solid, opaque, and brittle, and are usually characterized by a strong and distinctive taste and odor. They do not flow naturally from plants, but are chiefly extracted by means of incision, or cutting. The principal gum resins include asafetida, aloes, gamboge, and myrrh (all of which see).

G.M.S.

**GUN**. See CANNON; RIFLE; and other articles referred to under those titles.

**GUNBOAT**, a small war vessel specially built for service in rivers and coast waters, for coast defense and patrol duties. The first iron vessel of this class was built for the British navy in 1867; it carried only one gun, but the armament was greatly increased in later designs. Many wooden gunboats carrying only one gun were built for use in the War of 1812, but proved disappointing. The modern gunboats of the United States navy would be more properly classed as small cruisers, as they carry heavy armament and are ocean-going vessels. Gunboats are now extensively used by the British on the Nile, the Zambezi, and other rivers, and for service on the Chinese coast, but the one-gun vessel has been entirely superseded. The latest type, now used in all navies since about 1900, is built of steel, fully armored, and carries two four-inch, quick-firing guns, four twelve-pounders, and as many as ten machine guns. While effective as auxiliaries and patrols, gunboats are not sufficiently fast or powerful to be formidable by themselves. See NAVY.

**GUNCOTTON**, an explosive prepared by steeping cotton in a mixture of sulphuric and nitric acids. It was discovered in 1845 by Professor C. F. Schönbein, a German chemist of Basle, Switzerland, and has since become one of the most important of explosive materials. Sulphuric acid does not enter into the composition of guncotton in its final form, but serves to remove water formed by the reaction of the acids and the cellulose. After being steeped in the acid mixture, the cotton mass is drained and washed, then boiled in water to insure the removal of any remaining traces of acid, and to effect the decomposition of any impurities present. The purified mass is ground to a pulp, drained, and compressed into

slabs or blocks while moist; or it may be dried in air, either in the original form or after pulping and compression. When ignited, dried guncotton burns very rapidly with a hissing sound; if struck with a hammer on an anvil, it will explode. Wet guncotton is much safer to handle than dry. It cannot be made to burn, it can be kept in storage indefinitely without deterioration, and can be detonated only if set off by the discharge of another explosive. It attains a detonating velocity that may be as high as three miles per second.

Guncotton burns or explodes too rapidly to be used as a propellant in firearms or big guns, but it is an ingredient in various smokeless powders used as propellants. In military blasting operations, such as the blowing up of bridges, extensive use is made of wet guncotton. During the World War, the explosive was successfully made from wood cellulose. Huge quantities of guncotton were used in torpedoes and submarine mines.

Chemically, guncotton is a type of *cellulose nitrate*. It is commonly called a *nitrocellulose*, but this term is applied with scientific accuracy only to true nitro compounds, of which guncotton is not an example. Nitrated celluloses of lower degree of nitration than guncotton find wide use in the manufacture of plastics like celluloid, in the preparation of blasting explosives, in photography, and in the making of substitute silk, or rayon.

T.B.J.

**Related Subjects.** For supplementary information the reader is referred to the following articles:

|           |                  |
|-----------|------------------|
| Blasting  | Explosives       |
| Cellulose | Rayon            |
| Celluloid | Smokeless Powder |

**GUN METAL.** See BRONZE.

**GUNNISON CANYON.** See COLORADO (The Rivers).

**GUNPOWDER**, the oldest explosive of which there is definite knowledge. For five centuries it was the only substance used to drive shot from guns. Credit for the invention of gunpowder has been given the Chinese, the Arabs, and the Hindus, but the exact nature of the burning substances used by them in fireworks or for military purposes is a matter of great uncertainty. Not until 1242 was there published a precise statement of the composition of gunpowder. In that year, Friar Roger Bacon of Oxford wrote a book in which he told how to make an explosive mixture containing saltpeter, and for this reason he is sometimes called the inventor of gunpowder. How much he owed the ancients for his formula will never be known, but it is probable that the burning substances used by them were projected by machines, and were not in themselves propellants. Berthold Schwartz, a German monk of the fourteenth century, also shares in the honor due those who helped to develop a practical explosive, but his particular con-

tribution is thought to be the invention of firearms depending for their action on gunpowder. At all events, there is definite record that cannons were in existence as early as 1326 in Florence, 1338 in France, 1340 in Germany, and 1344 in England. One writer chronicles the use of gunpowder at the Battle of Crécy in 1346, and describes the terror of the horses and men at this new kind of "thunder."

Certain it is that the adoption of gunpowder as a propellant in guns changed the history of the world. In Europe it helped to wreck the institution of feudalism, by making the foot soldier with his musket the equal of the knight in armor (see FEUDAL SYSTEM). Gunpowder also enabled civilized peoples to extend their rule over savage countries, and under its protection to develop industry and commerce.

**Uses.** Besides being employed as a propellant in guns, gunpowder had become an important blasting material by the seventeenth century, finding use in mining, in road construction, and in the blowing up of fortifications. With the development of more powerful explosives in the nineteenth century, it was largely replaced as a blasting material by dynamite and other detonating preparations, but is still employed to some extent in coal-mining, and for industrial purposes where powerful explosives are not required. As a propellant, it has the disadvantage of causing the formation of clouds of smoke, since its combustion yields solid products. Hence modern smokeless powders, with cellulose as a base, have superseded gunpowder for propelling shot from guns. For other military purposes, however, gunpowder is extremely useful. It is employed as a bursting charge for shrapnel, as an explosive in time fuses, and as a primer to ignite smokeless powders. Gunpowder also continues to be used in fireworks for display purposes.

**Composition and Manufacture.** Like the early gunpowders, the modern explosive, commonly called *black powder*, is a mechanical mixture of charcoal, sulphur, and saltpeter (potassium nitrate), though some of the cheaper grades are made from Chile saltpeter (nitrate of sodium), which itself is a source of potassium nitrate. The explosive action of gunpowder is an extremely rapid burning, in which the oxygen necessary for combustion is supplied by the nitrate.

The process of manufacture is essentially as follows: The three ingredients, after careful preparation and refining, are brought together in a mixing machine. A standard formula adopted in English-speaking countries requires the following proportions: saltpeter seventy-five per cent, charcoal fifteen per cent, and sulphur ten per cent, though there may be variations designed to yield a product suitable

for special purposes. From the mixing machine, the material is taken to a mill where it is ground while moist between heavy rollers; it is then placed in another machine and reduced to a meal. The meal is crushed in a hydraulic press, that it may acquire high density, and subsequently is broken into grains of the desired sizes, which are glazed, dried, and blended. Glazing breaks off sharp points and fills up pores in the grain, so that the powder acquires resistance to moisture and dust. Sometimes the grains are molded into cubes or prisms. In another process, the charcoal and sulphur are ground together and the saltpeter separately.

T.B.J.

**Related Subjects.** The reader is referred in these volumes to the following articles:

|            |                  |
|------------|------------------|
| Ammunition | Saltpeter        |
| Blasting   | Shrapnel         |
| Charcoal   | Smokeless Powder |
| Explosives | Sulphur          |

**GUNPOWDER PLOT**, in English history, a conspiracy to blow up the Houses of Parliament with gunpowder, on November 5, 1605, when King James I was to preside at the ceremonies attending the opening of the sessions. The plot originated with a group headed by Robert Catesby, Guy Fawkes, and others, who resented the hostile attitude of the government toward Roman Catholicism. One of the conspirators, wishing to save a friend from the general destruction, wrote him a letter warning him not to be present at the opening of Parliament. This led to the discovery of the plot and to the arrest and execution of most of those concerned in it. The conspirators, instead of remedying the condition of the Roman Catholics in England, only increased their oppression. For many years an annual festival was held on November 5, when it was the practice to burn Fawkes in effigy. Guy Fawkes Day is still celebrated, in some localities, by the setting off of fireworks; and a formal search of the vaults beneath the Houses of Parliament, just before the opening of a new session, is still customary.

**GUNTHER**, *gun' tur*, in Norse mythology. See SIGURD; NIEBELUNGENLIED.

**GURKHAS.** See NEPAL.

**GURU GOVIND**, organizer of the Sikh political state. See SIKHS.

**GUSHER.** See PETROLEUM (Illustration: Shooting an Oil Well).

**GUSTAF V** (1858- ), also known as GUSTAVUS V, king of Sweden. He came to the throne in December, 1907, at the death of his father, Oscar II. King Gustaf was born in the castle at Drottningholm, entered the army at the age of seventeen, and studied at the University of Upsala. During the years 1878 and 1879, he spent his time traveling in most of the countries of Europe. In 1881 he married Victoria, the daughter of the Grand Duke of

Baden. From 1884 to 1891, he served as regent of Norway, during the illness of his father, and in 1892 became lieutenant general. Several times, during his father's absence or illness, he acted as regent, so he was well prepared to assume the royal duties when he was called to the throne. In 1914 King Gustaf made a patriotic speech at a mass meeting of 40,000 peasants, in which he advocated increased armament, thus arousing criticism among the Liberals and Socialists, who opposed his militaristic policy. In the World War he sympathized with Germany, and succeeded in keeping Sweden neutral. See SWEDEN (Recent History).

**GUSTAVUS**, the name borne by four kings of Sweden, of whom the second, known as Gustavus Adolphus, was particularly notable.

**Gustavus I** (1496-1560), founder of the royal House of Vasa, and king from 1523 to 1560, is commonly known as **GUSTAVUS VASA**, the name *Vasa* being derived from a device on his coat of arms which resembled a vase. He was the son of Erik Johansson, a Swedish nobleman. At the age of eighteen, Gustavus adopted the cause of the Swedes, who were fighting for independence from Danish rule, and four years later he was treacherously carried off by the king of Denmark, with five other Swedish hostages, and held a prisoner for over a year.

Eventually he made his escape; taking refuge in the Swedish province of Dalecarlia, he roused the peasants of that district to resist the oppression of the Danes. At the head of the Swedish forces, he won many victories, and after the capture of Upsala, was proclaimed administrator of the Swedish kingdom. Two years later, in 1523, the Swedish Diet declared the union of Sweden and Denmark dissolved, and proclaimed Gustavus king. During his reign of forty years, Protestantism was established as the state religion, and the material prosperity of the country was greatly advanced. When he died, Sweden possessed a well-supplied treasury, a standing army of 15,000 men, and a good fleet.

**Gustavus II**, better known as **GUSTAVUS ADOLPHUS** (1594-1632), was the celebrated general who turned the tide for the Protestants in the Thirty Years' War (which see). He was the grandson of Gustavus I, and succeeded his father, Charles IX, in 1611, at a time when the country was involved in wars with Denmark, Russia, and Poland. In bringing these wars to a conclusion, he won large tracts of territory for Sweden, made his armies the most efficient in Europe, and won for himself the title "Lion of the North."



Photo: Brown Bros.

KING GUSTAF V

Peace was declared in 1629, and the next year, at the head of an army of 13,000, Gustavus invaded Germany, where the Protestants were facing defeat in the Thirty Years' War. In 1631 he defeated a Catholic army under Tilly at Breitenfeld, and the following year overwhelmed the forces of Wallenstein (which see) at Lützen (see LÜTZEN, BATTLES OF). In this great battle he himself was mortally wounded, but he had saved the cause of Protestantism in Germany. A noble monument now marks the spot where he died. During the brief periods when Sweden was at peace, Gustavus Adolphus devoted himself to the development of his country's commerce and manufactures, and it was due to him that the Scandinavian kingdom attained a supreme position among the nations of the North.

**Gustavus III** (1746-1792) ascended the throne in 1771, at a time when the country was harassed by the rivalry of political parties and by the misrule of the nobles. The sovereign at this period was merely a figurehead. Gustavus recovered the powers his predecessors had lost, by forcing the Diet to accept a new Constitution, but his reign was not distinguished in other respects. A war with Russia, begun in 1788, resulted in nothing to his advantage. Four years later, he was shot at a masked ball through a conspiracy of the nobles, who were jealous of the powers which he had gained. Gustavus III was a dramatist and poet of considerable ability.

**Gustavus IV** (1778-1837), also known as **GUSTAVUS ADOLPHUS**, was the son of Gustavus III, whom he succeeded in 1792. He began his personal rule upon reaching legal age in 1800. His reign was a series of follies, the outcome of his hatred of Napoleon. In 1807 the French wrested from the Swedes their last possessions in Germany, and in 1808 the king involved Sweden in a disastrous war with Russia, which was then an ally of France. This event came about through the opening of his ports to English vessels, which Napoleon was trying to prevent (see CONTINENTAL SYSTEM). As a result, Finland was lost to Sweden, and the exasperated Swedish nobles rose in revolt. In May, 1809, Gustavus was formally deposed by the Diet, and the Duke of Södermania was chosen king as Charles XIII. See SWEDEN (History).

**G U S T A V U S  
A D O L P H U S.** See SWEDEN (History); GUSTAVUS (IV); THIRTY YEARS' WAR.

**G U S T A V U S  
A D O L P H U S  
C O L L E G E**, a school at St. Peter,

Minn. See article MINNESOTA (Education.)

**GUSTAVUS VASA.** See SWEDEN (History); GUSTAVUS (I).

**GUTENBERG**, *goo' ten behrK*, JOHANNES (1400-1468), the inventor of the art of printing with movable type. By his device the letters were separated and movable blocks were used for the first time; previously, all printing had been done with solid blocks upon which words were engraved. The inventor's name originally was JOHANN HENNE GENFLEISCH, but he took his mother's name so that it should not become extinct.

It is said that the contemplation of a wine press gave Gutenberg his first notion of a machine for printing. To bring his invention to a successful point, Gutenberg was obliged to borrow money from Johann Faust, or Fust, a goldsmith and money-lender. After five years, Faust sued for the money which he had advanced for carrying on the business, and obtained possession of the printing outfit. He and his son-in-law, Peter Schöffer, claimed credit for the invention, but Johann Schöffer, son of the latter, states in the preface of a volume published in 1505 that—

The admirable art of printing was invented in Mainz in 1450 by the ingenious Johann Gutenberg, and was subsequently improved and handed down to posterity by the capital and labor of Johann Faust and Peter Schöffer.

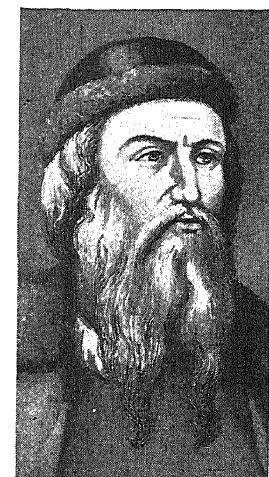
Gutenberg was born in Mainz in 1400, of a noble family, but left his native city in 1420 on account of political controversies. He was employed on mechanical works in Strassburg until 1448, when he returned to Mainz, and two years later formed the hapless partnership with Johann Faust. The earliest book issued from the press was the 42-line Bible, commonly known as the "Mazarin



Photo: Visual Education Service

#### THE GUTENBERG PRESS

This first printer to use movable type is exhibiting a proofsheet to a friend. The year is 1450.



JOHANNES GUTENBERG

Bible." He also printed several other religious books.

In 1465 Gutenberg was honored by the Archbishop Adolphus by a mark of distinction to which his genius and labor entitled him. He was admitted among the nobility of the court of the archbishop, and was given a pension. Statues have been erected in his honor, prominent among which is one by Thorwaldsen, erected in 1837 in Mainz. See PRINTING.

**GUTHRIE**, OKLA. See OKLAHOMA (back of map).

**GUTHRIE, SAMUEL**, an American, one of the three discoverers of chloroform (which see).

**GUTHRUM**. See ALFRED THE GREAT.

**GUTTA-PERCHA**, a milky juice obtained from various trees of the sapodilla family that grow in the Malay Peninsula and neighboring regions, but chiefly from *Palaequium gutta*. When dried, this substance has many uses similar to the applications of rubber. Like rubber it is flexible and extensible, that is, capable of being drawn out to great length, but differs from rubber in not regaining its shape, as it possesses little elasticity. Gutta-percha has very great cohesive power, and is soluble in chloroform, turpentine, and naphtha, but not in water. It is chiefly used as a covering for electric wires, since it has great insulating power. It is also employed in making containers for acids, coverings for golf balls, surgical bandages, casts, and teeth mountings.



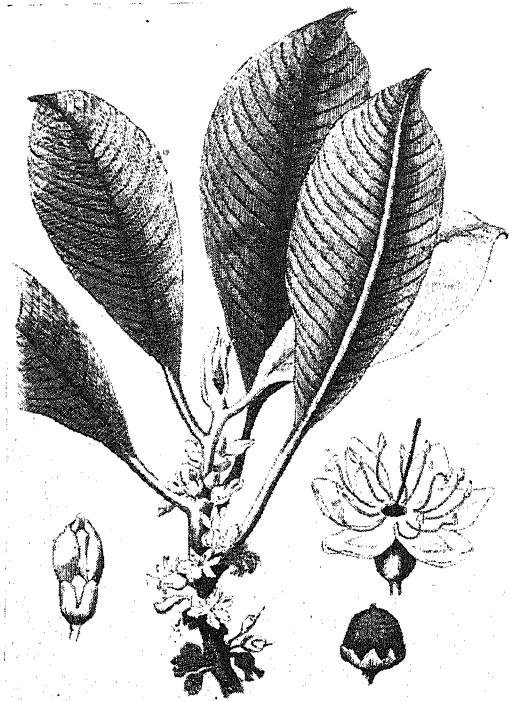
HOW TREES ARE TAPPED

The method is like that employed in the tapping of rubber trees.

Formerly, it was the sole insulating material for submarine cables, but rubber has replaced it for this purpose.

Gutta-percha is now obtained from the trees by a process of tapping, similar to that em-

ployed in the rubber industry (see RUBBER AND RUBBER MANUFACTURE). Formerly, the trees were cut down and the bark stripped



GUTTA-PERCHA

Branch of tree, with leaves, flowers, and buds.

from the trunks, a method that in time would have destroyed all the gutta-percha forests.

G.M.S.

**GUY FAWKES DAY**. See FAWKES, GUY; GUNPOWDER PLOT.

**GUYOT**, *ge' yo*, ARNOLD (1807-1884), a Swiss-American of high rank as a geographer and geologist, was born near Neuchâtel, Switzerland, and educated at the College of Neuchâtel and the University of Berlin. He took part with Agassiz in Alpine investigations, and later became professor of history and physical geography in the Academy of Neuchâtel. In 1848 he settled in Cambridge, Mass., and gave a series of lectures in New England, which he afterward published under the title *Earth and Man*. Guyot did much valuable work for the Smithsonian Institution in connection with meteorological science, which in 1855 earned him appointment as professor of geology and physical geography at Princeton. Here he remained until his death. He was the author of widely used textbooks on geography, and of a series of wall maps.

**GUYOT, MOUNT**. See NORTH CAROLINA (The Land); APPALACHIAN MOUNTAINS.

**GWYN, NELL** (Gwynn, or Gwin; Eleanor, or Nell), was probably born in 1650 in some

London alley. She sold oranges in the vicinity of Drury Lane Theater, and later went on the stage. Many of Dryden's plays were written expressly for her. Her beauty, good nature, and dramatic talents soon won the heart of the populace, especially those chafing under the restraints of Puritanism. She attracted the attention of Charles II, and although she gained a scandalous influence over him, she was wise enough not to interfere in affairs of state. She is mentioned by Sir Walter Scott in *Peveril of the Peak*. Nell, or "Poor Nellie," as the king sometimes spoke of her, died in 1687.

**GYMNASIUM**, *jim na' zih um*, a room or building devoted to instruction and practice in physical training, and usually provided with special apparatus. The apparatus used generally includes horizontal bars, parallel bars, flying rings, vaulting horses, poles, and ladders—both swinging and stationary—trapezes, mattresses, Indian clubs and dumb-bells, elastic exercisers, striking bags, rowing machines, etc.; also the simple devices needed for playing basket ball, indoor baseball and similar games of action. Good results, however, can be secured through right use of a gymnasium, even without elaborate or expensive equipment. The important thing is the exercise itself.

It is a matter of note that modern educators consider bodily development an essential part of education. Gymnasiums are now common in connection with public schools, and usually have trained teachers in charge. It is customary for cities to lay out open areas, particularly in the congested districts, and equip them as outdoor gyms for the use of neighborhood children, providing such simple apparatus as swings, slides, rings, seesaws, trapezes, bars, and the like.

Among the best-known gyms of the United States are those connected with the universities of Syracuse, California, Princeton, Yale, Harvard and Dartmouth. Up to the present time, Patten Gymnasium of Northwestern University, Evanston, Ill., is probably the most completely equipped university gymnasium in the world, having been built at a cost of \$300,000. Various private gyms are conducted by societies and individuals, where one may secure instruction and practice on payment of certain fees. For structures designed for outdoor exercises, participated in by students collectively, see STADIUM.

**What It Means in Germany.** In Germany the word *gymnasium* has a totally different meaning; there it is applied to the class of schools corresponding to the college-preparatory schools of the United States and Canada. In them the higher branches of literature and science are taught, and students must pass a severe examination before being admitted to the university. The German gymnasium is therefore a school for *mental exercise*, while the American gym-

nasium is a school for *physical exercise*. See GERMAN (Social Conditions: Education).

**Derivation.** The word *gymnasium* comes from a Greek term meaning *naked*, which was applied in ancient Greece to public places set aside for athletic sports. According to the custom, the boys and young men of those times wore no clothes when taking part in their games, in order that there might be perfect freedom of action.

**GYMNASTICS**, *jim' nas' tiks*, formal exercises for strengthening the different parts of the body and promoting health. Such exercises include club-swinging, to develop the muscles of the arms, wrists, back, and shoulders; bending exercises, for the benefit of the waist, hip, and abdominal muscles; running exercises, and the like. Gymnastic exercises, or the general and harmonious training of the physical organism, may be summarized in the general term *physical culture*. Some authorities use as a synonymous term *physical education*. For a detailed discussion of gymnastic exercises, with appropriate illustrations, see the article PHYSICAL CULTURE.

**GYMNOSPERMS**, *jim' no spurmz*. Botanists group all seed-bearing plants into two main divisions—those with no seed cases, that is, with exposed seeds, and those whose seeds are enclosed in a husk, pod, or other covering. The former are *gymnosperms*; the latter, *angiosperms*. All of the gymnosperms, embracing over 400 living species, are trees and shrubs. Most of them are evergreens and cone-bearing trees, such as pines and firs, and from them come many valuable products, including tar, rosin, turpentine, and timber. Cycads and the ginkgo are other gymnosperms. Since pollination of this class of plants is taken care of by the wind, they do not bear bright-colored flowers to attract insects. The exposed seeds of the pine can be seen between the scales of a cone, when the ripened seeds are ready to escape.

B.M.D.

**Derivation.** *Gymnosperm* is from two Greek words meaning *naked* and *seed*.

**Related Subjects.** The reader is referred in these volumes to the following articles:

|                         |                        |
|-------------------------|------------------------|
| Angiosperms             | Evergreen              |
| Botany (Classification) | Ginkgo                 |
| Cone-Bearing Trees      | Pollen and Pollination |
| Cycads                  | Seeds                  |

**GYPSUM**, *jip' sum*, is the source of plaster of Paris and alabaster (both of which see). It is a mineral compound of lime and sulphuric acid. Gypsum is found in large beds which are supposed to have been formed by the evaporation of water containing it in solution. It is usually white or yellowish-white, and is so soft that it can be scratched with the finger nail. Sometimes a crystallized transparent variety known as *selenite* is found. Crystals are often long and tapering, and usually are arranged in star-shaped groups.



Photo: U &amp; U

## A GYPSY HOME IN HUNGARY

Many people invest the gypsy with the glamour of romance. There is decidedly an absence of the romantic in this realistic picture of home life among these wanderers in Europe. The few American gypsies live usually in their wagons and automobiles.

When heated, gypsum is changed by a loss of three-fourths of its water to the fine, white powder known as plaster of Paris. This, when mixed with water and exposed to the air, hardens quickly, and is valuable for making all sorts of casts. It is most extensively used, however, for making the "putty coat" employed in finishing plastered walls in buildings,

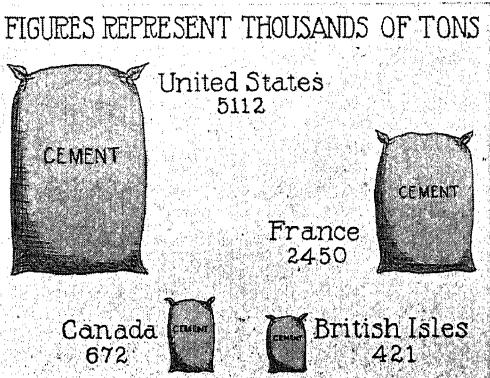
supplanted in many localities by commercial preparations or ground limestone. Most of the "hard" water from springs and wells contains gypsum in solution. When the water is boiled, some of the gypsum collects on the sides and bottom of the vessel, forming a white crust.

Gypsum is obtained in the United States chiefly in New York, Iowa, Michigan, Ohio, Texas, and Oklahoma; in Canada it is produced in Nova Scotia and New Brunswick. Both provinces export it to the United States.

A.N.W.

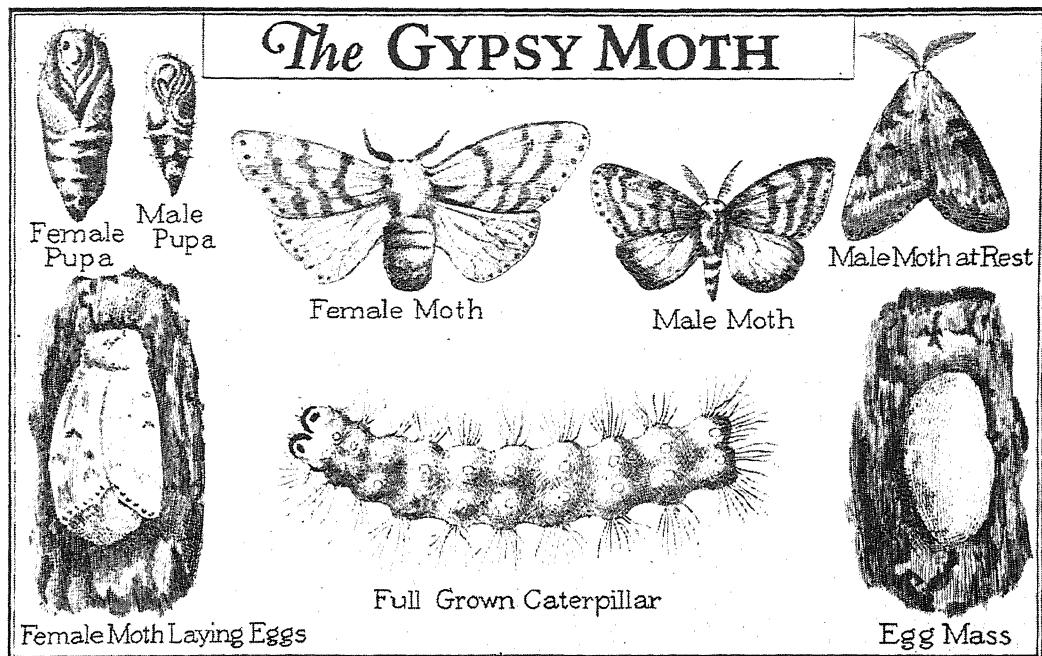
**Chemical Formula.** The formula for crystals of gypsum is  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ . This represents a combination of one molecule of  $\text{CaSO}_4$  with two molecules of water,  $\text{H}_2\text{O}$ . The first part of the formula indicates one atom of calcium, one of sulphur, and four atoms of oxygen. A molecule of water contains two atoms of hydrogen and one atom of oxygen.

**GYPSY, *jip' sie*.** A wealth of romance centers about this picturesque wandering race. Living in the midst of civilization, they are not a part of it, but maintain their own customs, racial characteristics, and language. Though they are without a definite history or a literature of their own, their wanderings have been traced from the Far East to every civilized country on the globe.



## AVERAGE YEARLY OUTPUT OF GYPSUM

and is sometimes employed as a cement. Ground gypsum is sometimes used as a fertilizer on soils needing lime, though it is being



If you have ever seen a band of gypsies traveling or in camp, you have probably been impressed by the brightness of the colors in their dress and equipment, and by the neglect of cleanliness, which contrasts strangely with their gaudy ornamentation. The origin of the *Romani*, as they call themselves, is unknown, but they are generally supposed to be the descendants of an obscure Hindu tribe. They reached Europe, in their migration, near the beginning of the fourteenth century, and arrived in England two centuries later. In appearance, the full-blooded gypsy, though rather undersized, is often very attractive, with regular features, olive skin, very black hair, dark and expressive eyes, and extremely white teeth. These physical characteristics are as marked as are those of the Jewish people. Both men and women lose their good looks early.

As a race the gypsies are long-lived; it is not unusual to see among them men and women of very advanced age who are still robust and vigorous. Their religious system, if one exists, is very vague, but traces of various forms of paganism are to be found in some of their customs and superstitions. In fancy, they people every wood and stream with spirits whose influence must be sought and whose wrath must be appeased by various rites and charms. The gypsies pursue different wandering occupations, such as basket-making, blacksmithing, tinkering, etc. Horse-trading, before the universality of the automobile, was one of the favorite activities of the men. The

women tell "fortunes." In Russia, Poland, and especially in Hungary, they are noted musicians, their melodies often figuring in popular light operas, as in *The Bohemian Girl*, whose "Gypsy Chorus" is remarkably tuneful.

There are probably 700,000 gypsies in Europe; Asia has thousands of them; they are found in North Africa, the United States, and have even entered Australia. Modern gypsies are without the romance credited to them by tradition and fiction; in carelessness of attire and general lack of grooming, they rank with the vagrant classes, and are regarded with disfavor. In America they are sometimes seen traveling in small automobiles. C.W.

**GYPSY MOTH**, in the caterpillar stage, a destructive pest of forest, shade, and fruit trees. It was introduced into Massachusetts from Europe in 1869, by a French scientist who was experimenting with silk moths. A few specimens escaped from his breeding cages, and among them were gypsy moths. Between 1890 and 1900, a sum reaching \$1,000,000 was expended by the state of Massachusetts in fighting the caterpillars, which were then stripping vast numbers of trees of their foliage. Only by unrelenting warfare can the pest be kept under control.

The name of the moth refers to the olive-brown color of the male, a slender creature with black-marked wings that have a spread of one and one-half inches. The female is white or buff-colored, and her well-developed wings have a reach of two inches or more. Yet the female never flies. A spring brood of

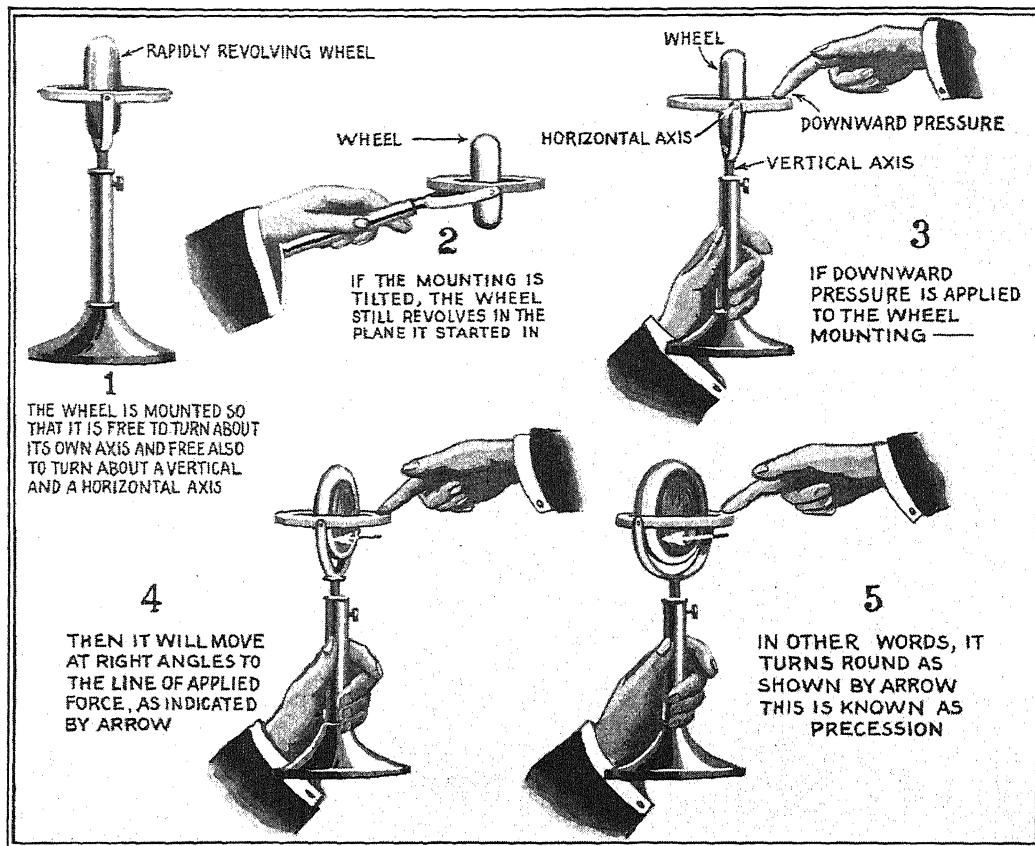


FIG. 1  
Explanation of the principles of the Gyroscope.

caterpillars hatches from eggs that were laid the preceding August. The larvae are hairy, brownish-yellow, and black-headed, and when full grown are two to three inches long. Most of their depredation is done at night, as they hide by day. In midsummer the caterpillars go to sheltered places and spin loose cocoons, and after pupating for two weeks, emerge as winged insects. The female moths lay their masses of tiny eggs—400 to 800 in a cluster—on tree trunks, rocks, and fences; the egg clusters remain through the winter unharmed by wind or weather.

An effective way to fight the gypsy moth is to collect and burn the egg clusters. A fire run over the ground will not always kill the eggs, however. Burning them in a stove is the surest way. The eggs can also be killed by applying the following mixture to the masses: creosote oil, 50 per cent; carbolic acid, 20 per cent; spirits of turpentine, 20 per cent; and 10 per cent of coal tar to color the mixture, to show which clusters have been treated.

Large numbers of caterpillars can be caught by banding infested trees with burlap or other coarse cloth. Since the caterpillars hide during

the day, many will choose the fold of the band as shelter; they can then be removed and killed. Spraying trees with arsenate of lead, using ten pounds to one hundred gallons of water, will destroy them if the work is done in May and June, while the creatures are still young. The United States Department of Agriculture is also using parasitic insects that prey on these pests.

W.J.S.

**Classification.** The gypsy moth belongs to the family of tussock moths, *Lymantriidae* (see TUSSOCK MOTH). Its scientific name is *Perithelia dispar*.

**Related Subjects.** The reader is referred in these volumes to the following articles:

Caterpillar  
Cocoon

Insect  
Moth

**GYROSCOPE**, *ji' ro skope*, a mechanical apparatus that demonstrates the principles of rotation and equilibrium of bodies in motion, the center of gravity, and centrifugal force. In form, a gyroscope consists of a circular disk with a heavy rim. It is mounted upon an axis in such a way that it can revolve with the least possible resistance. In turn, this axis is also mounted in a direction at right angles to that of the disk.

Fig. 1 illustrates the gyroscope in its simplest form. The wheel is heavy and firmly secured to its shaft. The outer ring is equipped with bearings carrying the shaft and allowing it to turn freely. This arrangement of simple parts exhibits none of the characteristic features of the gyroscope until the wheel is made to rotate. Then some of the seemingly impossible things of which the machine is capable become apparent. So long as the wheel is kept in rapid motion, the gyroscope resists any change in the wheel's plane of rotation with a force many times greater than the weight of the whole apparatus. This resistance to change increases with an increase in the speed of rotation. The "plane of rotation" in this case is an imaginary surface at right angles to the shaft and passing through the center of the wheel. This resistance to changing its plane of rotation is the essential characteristic of the gyroscope.

The gyroscope was discovered in 1832, but until recent years was little more than a scientific curiosity. It has now come into considerable use; the most important of its practical applications are the following:

As a stabilizer for ships, to reduce rolling in a rough sea;

As a substitute for the magnetic compass;

As a stabilizer for automatically balancing airplanes;

As a balancing device for monorail cars, and, in a developing field, for two-wheeled automobiles, the wheels being arranged as in a bicycle.

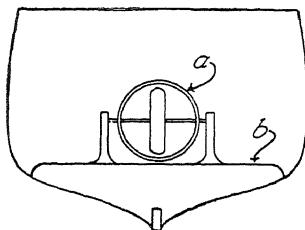
**The Gyroscope as a Toy.** Gyroscopes in several sizes can generally be bought in toy shops. Usually an instruction book is given to each purchaser, telling how to make the gyroscope "walk a tight-rope," balance itself on the edge of a tumbler, spin at the end of a string, etc.

**Ship Stabilizer.** The gyroscope has been successfully used to reduce in some degree the rolling of ships at sea. Fig. 2 shows the general arrangement and location of the gyroscope when used for this purpose. The supporting frame is firmly secured to the ship's hull and the wheel is rotated by an electric motor, as in all gyroscopes for practical use. The weight of a gyroscope for this purpose should be about  $\frac{1}{100}$  of the ship's displacement.

**Gyroscopic Compass.** In this form of compass, the gyroscope wheel rotates on a horizontal shaft. It spins in the same direction as the rotation of the earth, and so long as the power is operative, the spinning direction continues to be east and west. The advantage of this compass is that it is free from magnetic disturbances. A master compass and the required number of repeaters form the apparatus on large ships.

**Airplane Stabilizer.** Gyroscopes used for this purpose are mounted in the center of the airplane (from left to right), and operate in two ways. One method is to use the resisting power of the gyroscope to overcome any tendency toward tipping. The other is to use a smaller and lighter wheel connected to a series of levers that move small balancing vanes at the ends of the wings.

**GYROSCOPIC, *ji ro skop' ik*, COMPASS.**  
See GYROSCOPE.



(FIG. 2) ON SHIPBOARD  
(a) Gyroscope; (b) lower deck.

# THE WORLD BOOK

MODERN      ENCYCLOPEDIA      PICTORIAL  
COMPREHENSIVE

# H h

**H**, the eighth letter in the English alphabet, the so-called *aspirate*, or *breathing*, letter. In the Phoenician, from which, like practically all the English letters, it was derived, its name meant *look!* or *see!* and naturally the object chosen to represent it was that through which one looks—a



window. When the Greeks took over this letter, they gave it a new value, making it represent a vowel sound, and the English *H* is thus more closely related to the original Phoenician than to the intermediate Greek.

*H* has but one value in English, though in some words it is emphasized more than in others. In *bush*, for instance, it is more distinctly sounded than in *history*, while in some words, as *honor*, it is silent. Very frequently, it is joined with other consonants to form digraphs, which represent sounds that no single letter stands for. Thus *th*, *sh*, and *ch* are really necessary combinations. In other instances, however, the digraph represents a sound which is as well indicated by some single letter. *Rheumatism* could be pronounced as well without the *h*, while *trough*, *dough*, *trophy*, and *laugh* might be more simply spelled. In fact, *h* is one of the letters over which the advocates of simplified spelling have been most concerned; they think it should be eliminated from many words.

**HAAKON**, *haw' kohn*, VII (1872- ), king of Norway, assumed the crown upon the invitation of the Storthing in 1905, after the separation of Norway from Sweden. He was Prince Karl, the second son of Frederick VIII of Denmark. After attending the Danish Naval Academy, he served for some time as an officer in the navy. His love for and knowledge of the sea have made him very popular among the people of his adopted nation, who are descendants of the old Vikings. In 1896 he married Princess Maud, the youngest daughter of Edward VII of England. Their only son, Olaf, born in 1903, is the heir-apparent to the crown. The Norwegian people highly approved the choice of the Storthing in its selection of their king, and



Photo: Brown Bros.

HAAKON VII

he was crowned in the historic cathedral at Trondhjem.

When Haakon VII came to the throne, he adopted the name which was borne by six Norwegian kings in the Middle Ages. Their reigns are of little importance, except that of Haakon IV, or "the Old," who is remembered because he added Greenland and Iceland to his realm. See NORWAY (History).

**HAARLEM**, *hahr' lem*. See NETHERLANDS, THE (The Cities).

**HABAKKUK**, *hah bak' uk*, or *hab' a kuk*, a short book of the Old Testament, named after its author, the eighth of the minor Hebrew prophets and one of the tribe of Levi. Although not dated, the book was evidently a production of the Chaldean period, about 600 B.C., during the early part of Jehoiakim's reign. In the book, which is a poem as well as a prophecy, Habakkuk complains to God because he fears that the innocent will suffer as well as the guilty, but God tells him that the just shall be saved by faith. The destruction of the Babylonian Empire is foretold, and the latter part is a beautiful song of prayer and praise expressing the quiet confidence of faith in God and in His goodness.

**HABANA**, *hah bah' nah*. See HAVANA.

**HABEAS CORPUS**, *ha' be as kor' pus*, WRIT OF, a term incorporated in the English language from the Latin, and meaning, in substance, *you are commanded to have the body*. It compels the proper authority to produce a person in court at a time named, not for trial, but to determine whether there exists sufficient cause for his detention. The writ of *habeas corpus* is called "the great writ of personal liberty," because it makes unjust imprisonment or wrongful detention almost impossible. The writ is issued by a court at the request of some friend of a person accused of crime and held prisoner, and commands his custodian to bring him before the court, where his claims may be heard and judged. To obtain a writ of *habeas corpus*, it is only necessary to observe legal formalities in presenting the request to the court, for except in times of public danger, the right of any person to secure this writ cannot be denied. The foundation of the present form of *habeas corpus* in all English-speaking nations was laid in England's Magna Charta (which see), and the American and Canadian writs are an adaptation of the English form.

The application of this writ is very liberal. Besides its common uses, as named above, cases have been heard where it was invoked to solve domestic wrongs, as when a wife is held captive and maltreated by her husband, and where a child of divorced parents has been held by one parent longer than the time allowed by the court.

**HABICHTSBURG**, *hah' bikts boorK*. See HAPSBURG, HOUSE OF.

**HABIT**. "Sow an act," says an old proverb, "reap a habit; sow a habit, reap a character." Another popular saying declares that "Habit is second nature." These statements do not overemphasize the part played by habit in the life of the ordinary human being. A habit, by definition, is a *fixed tendency* to perform certain acts in a certain way—a tendency so strong that it is beyond the jurisdiction of the will and sometimes beyond that of consciousness.

**How Habits Are Formed.** Most habits, to be sure, originate in conscious acts, but every time the act is performed, it becomes easier and simpler, until in time it ceases to need attention. When a baby is first given a spoon and allowed to feed himself, every act is a conscious one. He picks up the spoon, carefully turns it right side up, takes up the food with it, and guides it as accurately as may be to his mouth. But not a very long time elapses before the whole business of eating becomes habitual, and, in a manner, takes care of itself.

Listen to a child practicing her music lesson. With her eyes first on the printed page, then on the keyboard, she carefully picks out each note, and as carefully chooses its counterpart on the piano. But hear the same child years later. Apparently, the brain says to the fingers, "Play

the Paderewski *Minuet*," and they play, quite without guidance from the brain; for the performer can carry on a conversation and not seriously interfere with her playing, for it has now become habitual.

**How Accounted For.** This is the psychological, or mind, phase of habit, but in the end it must work back to physiological, or bodily, processes. The general tendency of these scientists know, though they cannot describe just what really happens. Everyone has watched a little stream flowing down a hillside in its rather deep-cut channel. There must have been a time, long ago, when there was no stream bed—when the first drops of water found their way down the hill, flowing around a stone here, slipping through a sandy spot there, but always choosing the easiest path, the line of least resistance. Next time the snow melted on the hilltop and the water began to run down, that same path was just a little easier because it had been traveled before; and each time, this became more and more noticeable. Finally, following the route of the first tiny trickle, there appeared the actual stream bed, deep-carved in the rock.

It is in some such way that habits are formed, though the making cannot be watched so clearly. An action is performed once, and somewhere in the complex nervous system it leaves its tiny record. Next time the same action is performed, the record becomes a little clearer and more definite, until, finally, the action, so to speak, performs itself whenever the proper stimulus is given. To be sure, no one has ever seen these tracks which actions record on the nervous system, but they prove their existence positively.

**Importance of Habits.** Is habit, on the whole, a good or a bad thing? Suppose a man had to put his whole attention on every detail of everything undertaken; how much would he accomplish? The writer would be so occupied in seeing that his letters were correctly made that his brain could not concentrate upon original thoughts; the piano-player so busy glancing from music to keyboard and back again that the music produced would be a series of jerky sounds; the walker so interested in keeping his feet on the pathway that he would have no eyes for the beauties around him. As it is, the brain turns many of these simple functions over to the lower nervous centers, and is thus free to occupy itself with worthier things. Conscious attention, long continued, is a very fatiguing thing, and the more acts that can be performed habitually or unconsciously, the smaller the mental demand.

For instance, if a man who has daily work to do has to rouse himself and force himself to rise every morning; if he has to drive himself to his work each day, consciously bringing his attention to bear on it, he is using up a

great store of energy which might be expended in making his work more efficient. Indeed, nothing is a greater help to the worker in any field than the formation of habits which make the detail work as nearly automatic as possible.

As the right sort of habits may be most helpful, the wrong sort can certainly hinder. Most conspicuous of all—sometimes almost the only sort of habits to which the name is applied—are such habits as those which result from the craving for drugs or for alcohol; habits which originate in a bodily demand, and become in time so strong that the will cannot control them. But there are other habits which are little less harmful—nervous habits, which expend energy unnecessarily; habits of covetousness, or of bodily or mental sloth. Childhood and youth are the time of habit-forming—the old man is little more than a bundle of habits; and no one phase in the training of children is more important than that they shall be assisted in the forming of right habits (see following article). Ovid, a poet of ancient Rome, voiced a truth which never will change:

Ill habits gather by unseen degrees  
As brooks make rivers, rivers run to seas. C.E.S.

**HABITS IN CHILDHOOD, TROUBLESOME.** Two things are true about habits of all kinds. First, we do not inherit habits; we cultivate them. Second, our mental and physical condition throughout life is largely the result of the type of habits we have acquired during early childhood. Habits are nothing more nor less than constantly repeated actions. We cultivate a habit by doing something over and over again until it becomes a fixed part of ourselves. The habitual practice of some action makes it so automatic that we may become wholly unconscious of it, as in the case of walking or other common body movements. If we once realize that every habit must have a beginning, and that the majority of our habits begin during the earliest years of life, it is easy to understand the importance of the right habit formation during these impressionable years.

[It is not the purpose of this article to discuss the way in which good mental and behavioristic habits may be acquired. That important subject will be treated at length in other parts of these volumes. The present concern is with bad habits of a physical type that so definitely affect health.]

**Training for Good Habits.** The basis of all habit formation, whether good or bad, is regularity and repetition. From the moment of birth, the habits of all children are largely determined by the routine of the environment. These environmental conditions are the responsibility of the parents and nurse during the first few years that are now known by the term, the *pre-school age*. Our goal, then, is the formation of good health habits during these immensely important first five years of life. The cultivation of habits begins soon after

birth. A baby will learn at an incredibly early age that he can get what he wants if he cries for it, and there can be small wonder if he uses this knowledge to achieve his purpose. He also learns that this cry will attract attention to him, and that he may easily become the center of interest by the use of this simple method. If he is fed at night at any time in addition to his stated feeding, he knows that he can get this additional feeding the next night if he makes his demands known. He wishes regularity on his own terms, and unless a serious effort is made to turn this desire into directions best suited to his health, both mental and physical, he can, and will, build up a series of bad habits that will affect him throughout life.

Training for good habits should begin before bad habits have been established, and this means attention to all the details of healthful living. Positive health habits will prevent the dreaded manifestation of wrong tendencies. Children under five are innately willing to be guided; if we fail to lead them in the right direction, the fault is ours and not theirs. It is far easier to prevent bad habits than it is to correct them, once they occur. This holds true no less of the good habits of eating, sleeping, exercise, digestion, bowel movements, cleanliness, and care of the teeth, than it does of the more noticed wrong habits of thumb-sucking, nail-biting, and other troublesome manners of childhood. A regular routine of wholesome living will start any child on the right road to health; lack of such a routine will breed a plague of bad habits.

**Regularity in Activities.** As the first important step toward health, regular hours of feeding, sleeping, play, and exercise are essential from the time of birth. Once fixed, they should never be deviated from until the baby's growth makes such a change necessary, and then the only alteration should be a change in schedule; the regularity of time must continue. The baby who is always fed when he cries will always cry to be fed, but the baby who has his food at set and regular intervals will adjust his appetite and desire for food to the time when it is due. Sleep is a matter of habit from the time of birth, and once the habit is established, it will continue as a normal incident of life. The baby who is trained to a regular routine in these matters that are essential for health, and whose good health habits continue during early childhood, will have little or no opportunity to show any wrong tendencies. Such a routine does not stifle individuality, for it leaves plenty of time for wholesome activity and that essential mothering that every baby and little child must have if it is to thrive.

Many mothers who are careful to an extreme in giving their babies the right environment and care will let this lapse as soon as babyhood is

past. The formative and important years that lie between infancy and the school age have well been called "the neglected age." These are the years when bad habit formation comes almost unawares, and the time when good habits are readily cultivated. Granted, then, that regularity and routine have been learned and applied in the right way, the prevention of bad habits is practically assured.

S.J.B.

**Related Subjects.** Parents who desire to explore further into the problems confronting them in rearing children are referred to the following articles:

Anger in Childhood  
Character Training  
Child  
Dishonesty in Childhood  
Fatigue and Nervousness  
in Children

Heredity (Inheritance of Intellectual and Moral Traits)  
Mental Conflict, a Cause of Misconduct

**HABIT SPASMS.** See EDUCATION (Hygiene of Education).

**HABSBURG, hahbs' boorK.** See HAPSBURG, HOUSE OF.

**HACKBERRY.** See NETTLE TREE.

**HACKENSACK, N. J.** See NEW JERSEY (back of map).

**HACKENSACK RIVER.** See NEW JERSEY (Rivers and Lakes).

**HACKETT, CHARLES** (1887- ), an operatic tenor who is widely known in three continents. He was born in Worcester, Mass., and was educated in a local high school, beginning his musical career by singing in the high-school glee club. When only nineteen, he sang in concert with Nordica, at Providence, R. I. Subsequently, he sang the tenor rôle in Verdi's *Requiem Mass*, in New York, with Alma Gluck, Louise Homer, and Herbert Wither-spoon. After studying in Florence, Italy, Hackett made his début in *Mignon* in Genoa, in 1915, and afterward made fourteen appearances at La Scala, Milan's great opera house.

After completing successful tours in Europe and South America, he joined the Metropolitan Opera Company of New York, but since 1923 has been a member of the Chicago Civic Opera Company. He has a voice of great sweetness, and marked dramatic gifts that are especially effective in the lighter operatic rôles, such as that of Romeo in *Romeo and Juliet*.

**HACKETT, JAMES KETELTAS** (1869-1926), an American actor and manager, who, at the age of twenty-four, became a leading man in New York, the youngest in the stage history of

that city. He was born on Wolfe Island, Ont., the son of an American comedian, and after graduation from the College of the City of New York, studied at the New York Law School. In 1897 he married an actress, Mary Manner-ing, and appeared with her in various successful plays.

Later, he became one of the few independent managers in the United States, producing *Samson*, *The Grain of Dust*, and several operatic plays. After being divorced from Miss Manner-ing, he married Beatrice M. Beckley of London, in 1911. Three years afterward, on the death of an aunt, he received an estate valued at about one million dollars. The last years of his life were spent in Paris.

**His Plays.** Under the management of Daniel Frohman, his greatest successes were in *The Prisoner of Zenda*, its sequel, *Rupert of Hentzau*, and *The Pride of Jennico*. In later years, he became known for his Shakespearean characterizations, notably *Macbeth* and *Othello*.

**HACKMATACT.** See LARCH.

**HADDOCK,** *had' ok*, an important species of food fish belonging to the same family as the cod (which see). The chief haddock fishing grounds are the American Atlantic waters between Cape Hatteras and the Straits of Belle Isle, and European waters from Iceland to France. Haddock are found in greatest numbers in the North Sea and around the British Isles, and, in summer, along the coast of Massachusetts. The haddock differs from the cod in the following particulars: It has a conspicuous black line running from head to tail; it possesses a smaller mouth than the cod, and a longer first fin on the back. Haddock are also smaller, with an average weight of three to four pounds, and a maximum of seventeen pounds. Haddock swim in large schools and feed on the bottom of the sea, while cod take the bait when it is somewhat above the ocean floor. Salted menhaden and stale clams are the most tempting bait for haddock, but they feed on all available species of invertebrates.

Their flesh is well liked, and is marketed fresh, smoked, salted, and dried. Finnan haddie, so named from the town of Findon, Scotland, is produced by a Scotch method of smoking and drying. Haddock landed at the chief American ports exceeds cod in quantity and value of product, as reported by the United



CHARLES HACKETT



Photo: U &amp; U

JAMES K. HACKETT

States Bureau of Fisheries. The annual production ranges from 65,000,000 to 80,000,000 pounds.

L.H.

**Scientific Name.** The common haddock is known as *Melanogrammus aeglefinus*.

**HADES**, *ha' deez*, the word used in the revised version of the Bible as the equivalent of *hell*, to denote the final abode of the lost (see **HELL**). It has also been applied to the abode of the souls of the dead, whether good or bad. The true meaning of the word has aroused much discussion, as it embraces several Greek words which differ slightly in theological meaning or purport.

In Grecian mythology, Hades, or Pluto, was the god of the lower world, the son of Chronos and Rhea. He left his realm but once, and then to go in search of Proserpina (which see), whom he made his queen. See **PLUTO**.

**HADJ, OR HAJJ**, *haj*, the Arabic name of the pilgrimage to Mecca which every faithful Mohammedan is bound to make, if possible, once in his life. After he has accomplished this religious task, he may assume the title of *Hajji*. A similar pilgrimage to Jerusalem by members of the Greek and Armenian churches also confers the same title. See **MOHAMMEDANISM; MECCA**.

**HADLEY**, *had' lih*, ARTHUR TWINING (1856-1930), an American educator, president of Yale University, and one of America's foremost

railroad economists. He was graduated from Yale in 1876 with highest honors, his special interest being in political science and economics. After post-graduate study there and at the University of Berlin, he began teaching at Yale, and became in turn tutor, lecturer on railroad administration, professor of political economy, and finally, in 1899, president of the university, in succession to Timothy Dwight. He resigned in 1920.

ARTHUR T. HADLEY  
Administrator, economist,  
and public servant.

**A Public Servant.** His work in the university is not Hadley's only claim to distinction. He preached the doctrine of public service, and often made sacrifices in order that he might practice as he preached. He was Connecticut's commissioner of labor statistics from 1885 to 1887, and was one of the first to urge the abolition of child labor. On the subject of railroads, his advice was constantly sought by

Presidents, by Congress, and by active railroad men. President Taft appointed him chairman of a commission to investigate issues of railroad securities. In 1914 Hadley became a director of the New York, New Haven & Hartford Railroad, at a time when it had completely lost the public's confidence and was undergoing reorganization. No more striking evidence of Hadley's reputation for ability, fairness, and moral integrity could be given than the renewal of public trust in the railroad company, which followed his acceptance of these new duties.

**His Writings.** Professor Hadley is the author of numerous books, including *Railroad Transportation, Its History and Laws; Economics—An Account of the Relations between Private Property and Public Welfare; The Education of the American Citizen; Freedom and Responsibility; Standards of Public Morality; Some Influences in Modern Philosophic Thought; Undercurrents of American Politics; The Moral Basis of Democracy; and Economic Problems of Democracy*.

**HADRIAN**, *ha' drih an*, PUBLIUS AELIUS HADRIANUS (76-138), one of the "five good emperors" of Rome. Early in life he distinguished himself in war, and later filled



Photo: Brown Bros.

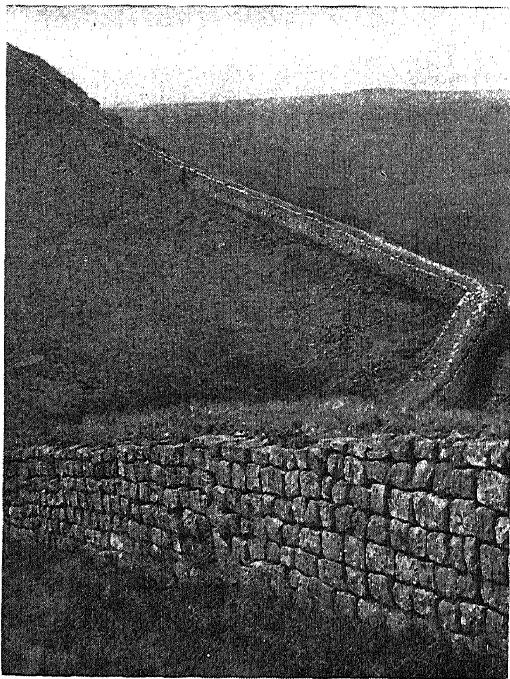
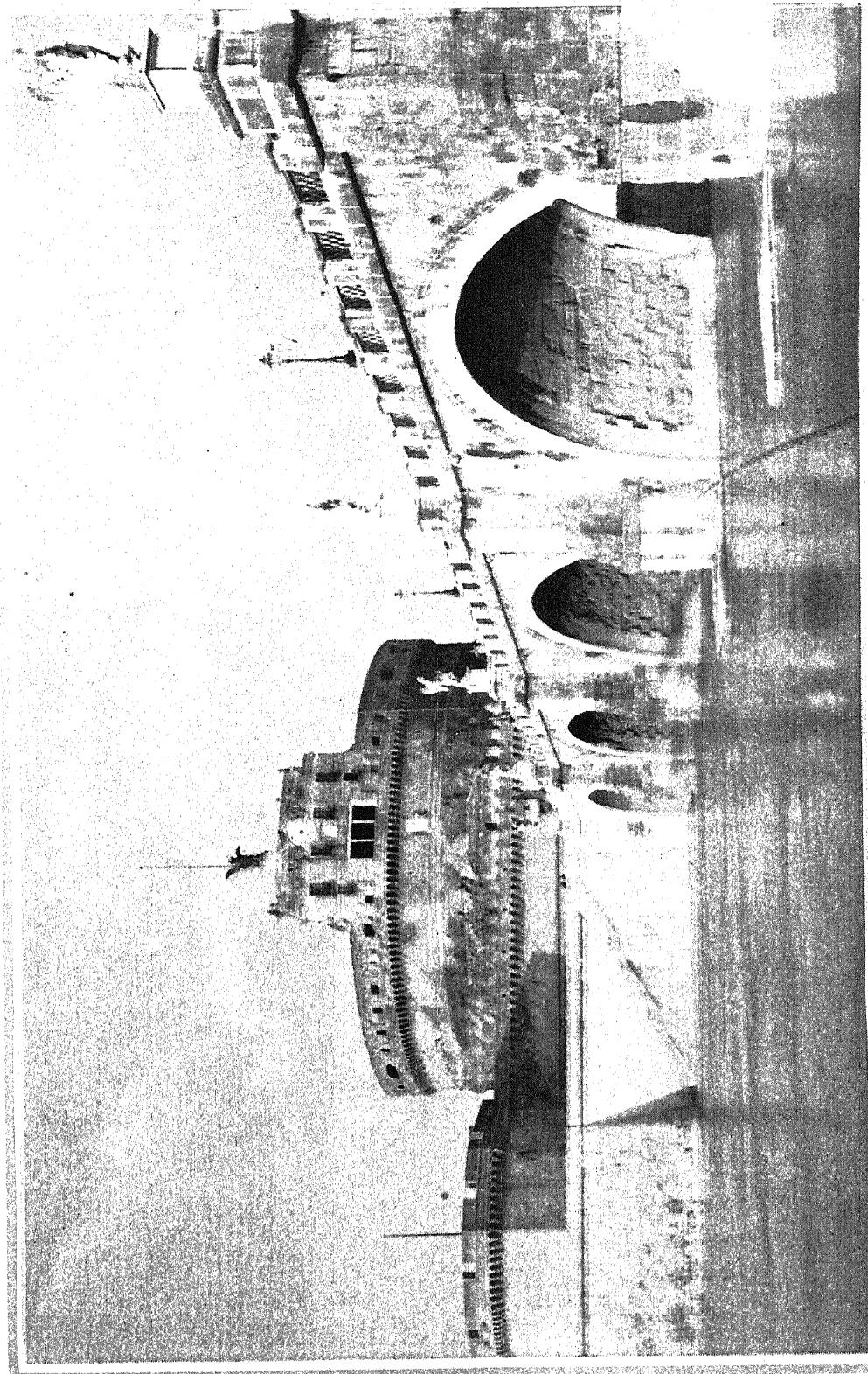


Photo: O R O C

**HADRIAN'S WALL**

Originally about seventy-three miles in length, it extended from Wallsend-on-the-Tyne to Bowness-on-the-Solway, England.

several important public offices. In 117 he served in the Parthian War under his kinsman, the Emperor Trajan, and on the latter's death



HADRIAN'S TOMB, NOW THE CASTLE OF SAINT ANGELO



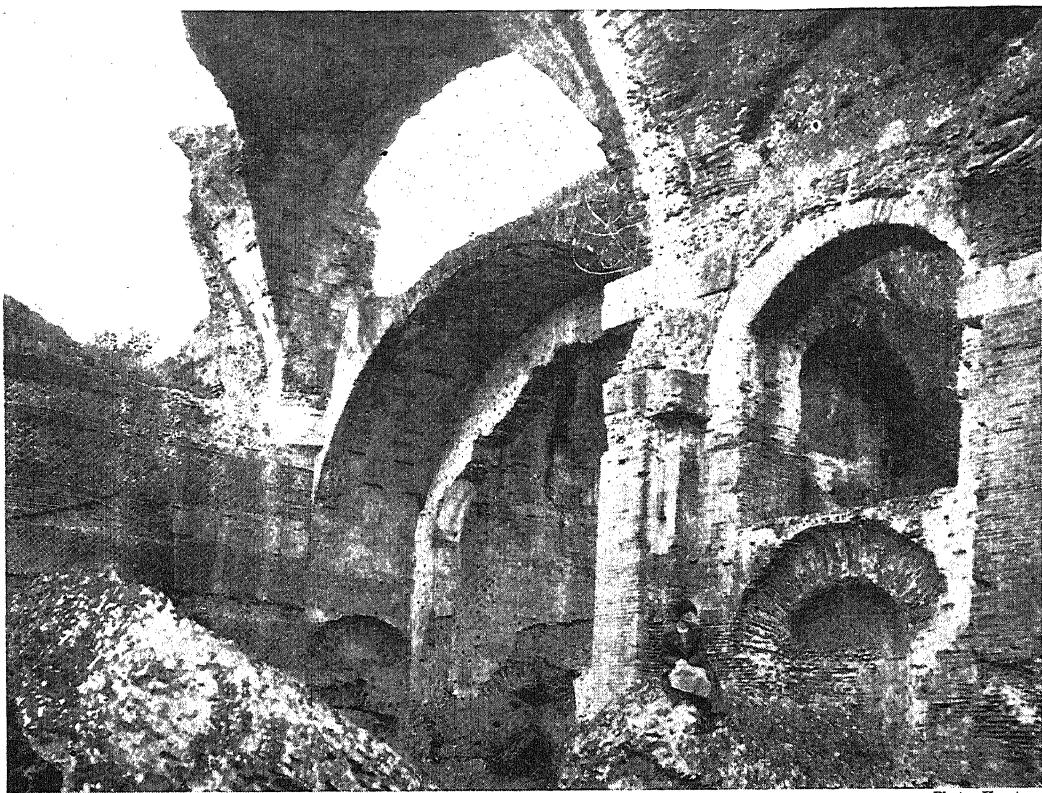


Photo: Keystone

## A RUINED HALL IN THE COLOSSAL BATHS OF HADRIAN

The colors of the masonry, in part vermillion and orange, offer sharp contrasts with the surrounding dark-green foliage. Here is a suggestion of the magnificence and pomp of the days of the Roman Empire.

was appointed his successor [see ROME (The Growing Empire)]. Believing it wise for political purposes to adopt a peaceful policy, Hadrian made terms with the Parthians, surrendering to them the territory beyond the Euphrates; he checked by generous gifts the invasion of the Roxolani, a clan which invaded his frontier; and by wise and humane methods he won the good will of his subjects. In Northwestern England there are traces of the wall he built as a defense against the Picts and Scots (see ROMAN WALLS).

In A.D. 119, Hadrian left Rome and made a tour of the empire, spending two years in Athens, his favorite city, which he enlarged and improved. The chief disturbance of his rule was a revolt of the Jews, which he subdued in 135. Hadrian's reign was marked by wise legal and military reforms, by many civic improvements, and by a spirit of toleration shown to the Christians.

**Hadrian's Tomb**, a massive tower in Rome erected by Hadrian in A.D. 130, and known in its remodeled form as the Castle of Saint Angelo. Originally, the structure served the purpose of a citadel. It is 230 feet in diameter, on a basement about 300 feet square. The ancient edifice is now almost hidden by the fortifications which have been added to it from time to time. The castle was held by the Popes from the time of Boniface IX, and in 1500 was connected with the VATICAN by an underground passage. See duotone full-page illustration, herewith.

**Hadrian's Villa**, an impressive country place laid out and built by Hadrian, near Tivoli. It covered an area of several square miles, and its different sections were named after the localities visited by the emperor in his travels. The ruins of its theaters, temples, baths, etc., are still in a fair state of preservation; they furnished choice examples of ancient art now reposing in the museums of Rome.

**HAECKEL, hek' el, ERNST** (1834-1919), a German zoölogist and author, born in Potsdam, the most prominent supporter of the Darwinian theories in Germany. For forty years Haeckel worked untiringly in zoölogy and made important contributions to the science. After his first scientific work was published in 1862, he wrote about forty books on science. He discovered and named more than 3,000 species of a single class of microscopic animals, searching the ocean for his specimens, from Helgoland to the Canary Islands, and from Great Britain to Malaysia. His most famous work, *The Riddle of the Universe*, was published in 1899, and has had over a million readers. It has been

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translated into every language that has any literature, and has excited a great deal of controversy.

Haeckel's first inclinations were toward botany; but later he studied medicine and zoölogy at Berlin, Würzburg, and Vienna, then turned his attention to natural science. In 1861 he became "privat-dozent" at Jena; the following year he was established in the chair of zoölogy at Jena University, and on February 16, 1909, celebrated his seventy-fifth birthday by resigning his professional position, after dedicating a beautiful new building, the Museum of Evolution, as a gift to the university. It was built at his own expense.

**Other Works.** In addition to *The Riddle of the Universe*, above noted, he wrote *Anthropology*, *The History of Creation*, *History of the Evolution of Man*, *Collected Popular Discourses on the Development Theory*, *Origin and Development of Animal Tissues*, and *The General Morphology of Organisms*.

**HAFIZ**, *hah' fiz*, a poetical name for Persia's greatest poet, Shams-ed-Din Muhammad, who died in 1389. He was born at Shiraz. Because of the lyric quality of his verse, he was known as *Sugar-Lip*. Hafiz is called the Persian Anacreon. The common people know his verses by heart and regard them as love songs, although the intellectuals look upon them as significant of an inward sight or knowledge of mystical elements, expressed through the physical senses.

**HAFNIUM**, *haf' nih um*, a chemical element whose discovery was announced in January, 1923, by two Danish chemists, D. Coster and G. von Hevesy. While engaged in experiments in X-ray spectroscopy, in the laboratory of Professor Bohr, at Copenhagen, the investigators discovered an element occupying the position 72 in the table of elements [see CHEMISTRY (The Elements)]. They named it hafnium from *Hafniae*, meaning Copenhagen. The honor

of identifying this element was shared with Dr. Alexander Scott of the British Museum, who had isolated it previously in New Zealand black sand, but had failed to complete his analysis.

Hafnium has properties similar to those of titanium and zirconium, and is usually found in the same ores as zirconium. Considered a rare metal at first, it is now known to be present in large amounts in ores from Brazil, France,

Greenland, Madagascar, Norway, North Carolina, and other localities. The black-sand deposit in which it was discovered in New Zealand is seven miles long and of unknown depth. It is believed that hafnium will become commercially valuable in the manufacture of incandescent mantles for gaslights. Scientists of the United States Bureau of Standards have identified characteristic radiations of hafnium with wave-lengths of the sun's spectrum. See ZIRCONIUM; TITANIUM. T.B.J.

**HAGAR**, *ha' gur*. See ISHMAEL.

**HAGEN**, *hah'-gen*. See NIBELUNGENLIED.

**HAGENBECK**, *hah' gen behk*, KARL

(1844-1913), a renowned collector of animals. He stocked nearly all the circus menageries and zoölogical gardens on three continents, and was a notable pioneer in the handling of wild animals. He employed sixty European hunters to assist him in collecting wild beasts.

Hagenbeck was born in Hamburg, Germany, where his father was a fishmonger, although he gave some attention to animal-training. When Karl was twelve years of age, his father asked him whether he intended to become a dealer in wild beasts or a fishmonger. The boy chose animal-training, and before he was a year older, took charge of his father's collection of animals. When P. T. Barnum visited Hagenbeck's animal park at Stellingen, near Hamburg, he bought \$15,000 worth of animals. In



HADRIAN'S VILLA

Photo: OROC

It was located about fifteen miles east of Rome, and was completed in the year 138. One small part of the former palace is shown.

1905 Hagenbeck sold 1,000 dromedaries, each animal provided with a suitable saddle, to the German government, for use in Africa. He collected the animals in less than three months after the order was received. The German government was so pleased with the handling of this remarkable order that it promptly ordered another thousand. Hagenbeck made his first visit to the United States and Canada in 1886. He exhibited more than a thousand animals at the World's Columbian Exposition at Chicago, in 1893, including many rare wild species.

**HAGERSTOWN**, Md. See MARYLAND (back of map).

**HAGGAI**, *hag' a eye*, a Jewish prophet of the Old Testament, who lived in Jerusalem about 520 B.C., after the Israelites had returned from their exile in Babylon. His prophecies, four in number, constitute the Biblical book of *Haggai*, in which the writer urged the people to proceed with the building of God's Temple. He predicted a greater glory for the new Temple than had belonged to the former one, and implied that Zerubbabel, the son of the governor of Judea, would become king of his nation.

**HAGGARD**, SIR HENRY RIDER (1856-1925), an English novelist whose works have had a persistent popularity, not because of special literary merit, but because they show a fertile imagination and are successful in creating and maintaining a weird atmosphere. The scenes of many of his best-known novels are laid in South Africa, and if the events he describes are unreal, and the setting almost equally so, the thrill is very real and endures after the memory of the actual plot is lost.

Haggard was born at Bradenham Hall in Norfolk, studied at Ipswich, and in 1875 went to Natal, South Africa, as secretary to the governor, Sir Henry Bulwer. After his return to England, he studied law, but finding fiction-writing both pleasant and profitable, he devoted himself to it for the rest of his life. Meanwhile he became an authority on agricultural conditions in Great Britain, and in 1905 was commissioned to report on the Salvation Army settlements in California and Colorado, with a view to establishing like colonies in the Transvaal. His reports on these surveys are published under *The Poor and the Land* and other titles. In



Photo: U &amp; U

H. RIDER HAGGARD

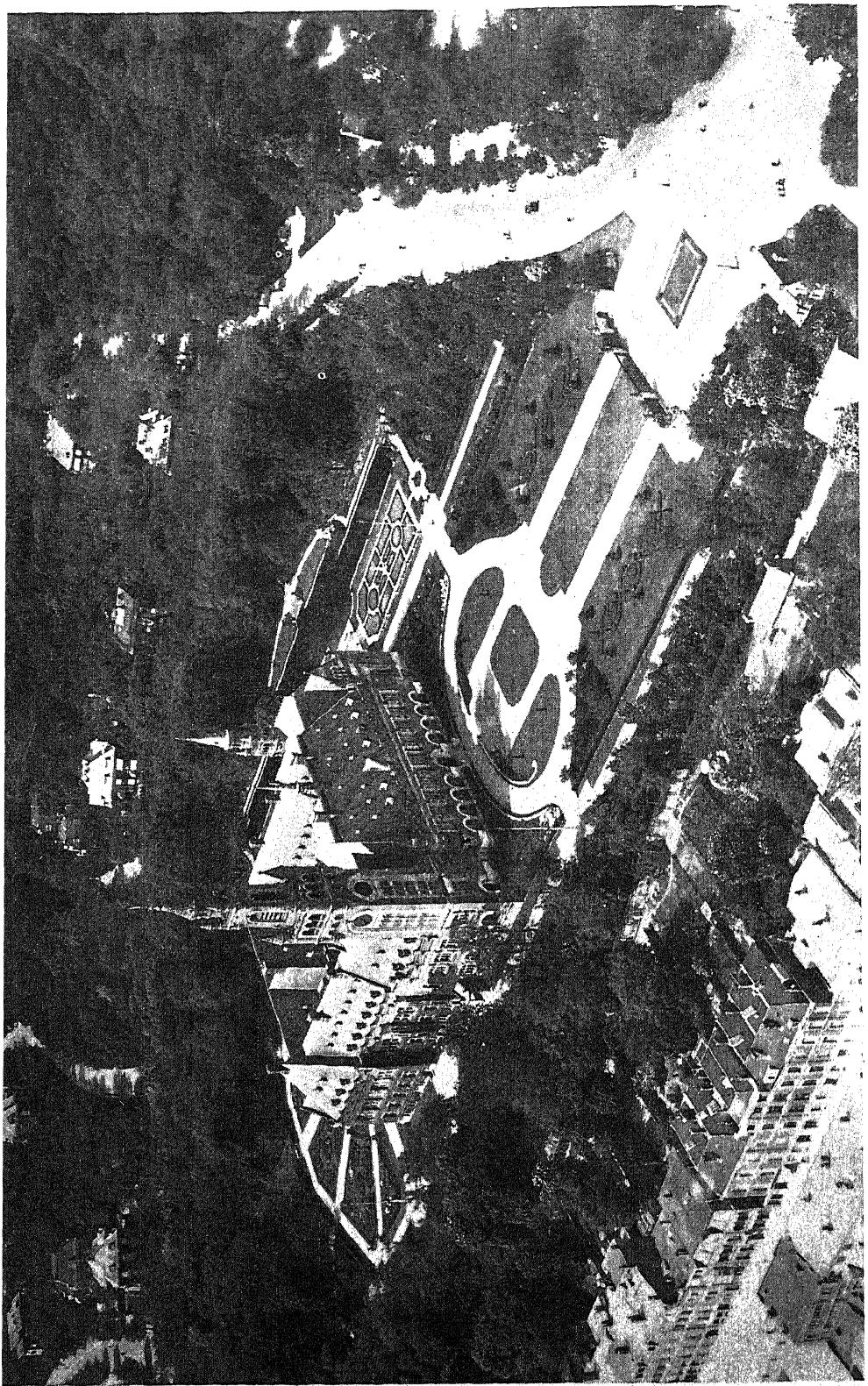
1912 Haggard was knighted by King George V. In 1919, for services in connection with the World War, he was created a Knight of the British Empire (K.B.E.).

**His Writings.** Haggard's first distinct success came in 1885 with the publication of *King Solomon's Mines*. Within the next four decades he wrote a score of stories, including *She*, *Jess*, *Allan Quatermain*, *Montezuma's Daughter*, *The People of the Mist*, *Ayesha or the Return of She*, *Child of Storm*, *Moon of Israel*, *When the World Shook*, *She and Allan*, *The Virgin of the Sun*, *Wisdom's Daughter*, and *Heu-Heu, or The Master*.

**HAGUE**, *hayg*, THE, the seat of government of The Netherlands since 1929 called Gravenhage. It is the city in that land of windmills and dikes where some of the most famous international alliances and treaties have been arranged. From a mere hunting lodge for the counts of Holland in the thirteenth century, The Hague became, in the eighteenth century, the center of European diplomacy. By the twentieth century, the eyes of the world were hopefully turned to this little spot on the map. It was the dream of peace-loving people that The Hague might become the neutral capital of the world—a place where representatives of all nations might meet to arbitrate questions of international importance, and thereby prevent war and its bloody sacrifice of human life in the future. As a monument to that dream, and built by Andrew Carnegie, a magnificent Palace of Peace now stands in The Hague as headquarters for the International Court of Arbitration.

The Hague lies on the southwestern coast, about three miles from the North Sea. The name is derived from the Dutch *Gravenhage*, meaning *the count's hedge*. It is a handsome city as well as a fashionable one, and has been described by De Amicis in his *Olanda* as half Dutch, half French. Broad streets are crossed by picturesque canals, which are lined with shops and dwellings and shaded by rows of beautiful trees. Throughout the city are numerous parks, and there are many fine old buildings, including the royal palace, the handsome government buildings, a beautiful Gothic church, and the celebrated art gallery. There are also many buildings of historic importance. The national monument, in the center of Willem's Park, is a magnificent memorial to the restoration of Dutch independence in 1813. The Huis Ten Bosch, or House in the Wood, is a beautiful suburban villa where the first peace conference met. There are good educational institutions in the city. The Hague is also the home of many learned societies.

Scheveningen, on the North Sea coast, is practically a suburb of The Hague, and is the most frequented seaside resort in Holland. The prosperity of the city depends chiefly on foreigners visiting that watering place and the



**Peace Palace at The Hague.** A magnificent palace dedicated by the donor to the hope that here would be cemented ties of peace among the nations of a world grown weary of war.

city itself, and upon the court and nobility. Little trade is carried on, and the manufactures are not important. Gold and silver ware, porcelain, hats, furniture, and carriages are the principal manufactures. The population of the city is over 391,000.

**History.** Originally the hunting center of Holland counts, The Hague became, in 1250, a residence for princes. From that it became the seat of the States-General in the sixteenth century, and then the capital of Holland. As the diplomatic capital of Europe, it is noted as the place where the Triple Alliance of England, Sweden, and the Netherlands, against France was concluded in 1668, as was also the Triple Alliance of England, France, and Holland in 1717 for the preservation of the Treaty of Utrecht. In 1899 the peace conference proposed by the Russian emperor assembled there, and The Hague was then chosen as the permanent place for international conferences. Another conference was held there in 1907 (see PEACE CONFERENCE, INTERNATIONAL). In 1920 a committee of the League of Nations Council met there to frame a scheme for the Permanent Court of International Justice (which see). The headquarters of the Court are now at The Hague. See Illustration of the Peace Palace, page 3004.

**HAGUE PEACE CONFERENCE.** See PEACE CONFERENCE, INTERNATIONAL.

**HAHNEMANN,** *hahn' e mahn*, SAMUEL CHRISTIAN (1755-1843), a German physician, founder of the homeopathic method of treatment of disease, established on the principle that "like cures like." He was born at Meissen, in Saxony, in 1775 went to Leipzig to study medicine, and paid his way chiefly by translating English medical works. He was graduated from Erlangen in 1779. After practicing medicine in various places, he translated Cullen's *Materia Medica* in 1789, and then

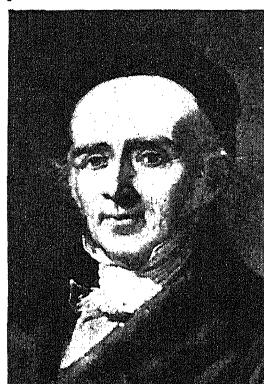


Photo: Brown Bros.  
SAMUEL HAHNEMANN

adopted a new method of curing disease. In 1810 he published his work, to explain his system to the world. In 1820 he was prohibited by the government from dispensing medicine, but Duke Ferdinand offered him a place at Kölhen, where he remained until 1833, then went to Paris, where a royal decree in 1835 authorized him to practice homeopathy. His system has gradually extended until there are now homeopathic physicians in all countries. See HOMEOPATHY; ALLOPATHY.

**HAIDAS.** See ALASKA (The People).

**HAIFA,** *hi' fah*, a seaport of present-day Palestine (which see).

**HAIG,** *hage*, EARL [SIR DOUGLAS] (1861-1928). The harrowing events of the World War were the stern proving ground for the character and ability of this great British soldier. The ultimate success of the allied cause was due in no small measure to his military foresight and the confidence with which he inspired his men. His rise to the rank of field marshal and commander in chief of the British Expeditionary Forces in France was a fitting recognition of his qualities as a leader of men.

Haig was a descendant of an excellent Scottish family, and was educated at Oxford University. He began his army career as a lieutenant in the Seventh Hussars in 1885. He served in both the Nile campaign and the South African war, and was advanced to the rank of colonel for his services in these campaigns. From 1903 to 1906 he was inspector general of cavalry in India, and later was made chief of staff in that country.

At the outbreak of the World War, Haig was appointed commanding officer of the first British army on the Franco-Flanders front. He was field commander at the Battle of the Aisne, led the terrific fighting at Ypres, and directed the costly victory at Neuve Chapelle. In 1916 he succeeded Sir John French as commander in chief of the entire British forces in France. It was his army that broke through the Hindenburg line, between Cambrai and Saint Quentin, in 1918. See WORLD WAR.

Upon his return to England after the allied victory, Haig was created earl, given a grant of \$500,000, and received the Order of Merit. The ancestral home of the Haigs was presented to him, the money for this purpose having been raised by popular subscription. He was offered several kinds of employment, after he retired from the army, but he preferred to devote his remaining years to the welfare of ex-service men. He became president of the British Legion, and of the British Empire Services League, and was appointed chairman of the United Services Fund, which became a very large benevolent organization.

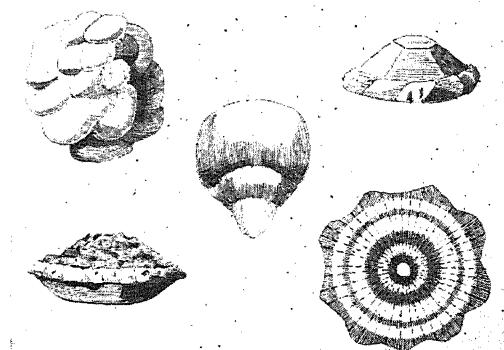
[For portrait of this great military leader, see full-page group of allied generals, in article WORLD WAR.]

**HAIKS.** See ARMENIA (History).

**HAIL.** There are three kinds of icy particles which fall upon the earth from the sky. Those who have not studied the phenomena call them all hail, but in reality that term can be applied to but one. One of the other forms falls in diminutive specks of compact snow about the size of tiny shot. This is *granular snow*, and is seen only in quite cold weather, often mixed with true snowflakes. The third form, also manifest only in cold weather, consists of

particles of ice; these are merely frozen drops of water, and are generally referred to as *sleet*.

Meteorologists tell us that hail consists of lumps of ice of various sizes; these may be as



A FEW FORMS OF HAILSTONES

small as peas, but on occasion they may be larger than walnuts; individual specimens have been found as large as lemons. A hailstone is comprised of alternate layers of clear and of snowy ice; it has a center usually of snow, and around this center various coats of ice form, the number of coats determining the size of the stone. Hail does not fall except in warm weather, and it comes with thunderstorms. The duration of the fall of hail is usually but a few minutes, though there is record of such storms of more than a half hour's duration. The area pelted by hailstones in any storm is usually but a small part of that covered by the accompanying thunderstorm; it is usually a rather narrow path in the area of rainfall.

The atmospheric conditions suitable for the formation of hail are a very warm stratum of air and a colder layer immediately above it. As the warm air rises, snow is formed, and the particles descend into the warm current and are partially melted. These are again carried up into the cold current, and another coating of moisture is frozen on their surface, when they again fall to the warm current. This process is repeated until the hailstones are so large that the air will no longer support them, and they fall to the ground. This explanation accounts for the peculiar structure of hailstones, and for the fact that they are formed only in the warm seasons of the year. R.H.W.

**Related Subjects.** The reader is referred in these volumes to the following articles:

Dew      Rain      Snow      Storms

**HAIL COLUMBIA**, a patriotic American song written in 1798 by Judge Joseph Hopkinson. Gilbert Fox, a young American actor, was to be given a benefit at the Old Walnut Street Theater, Philadelphia, and wishing to make the occasion a memorable one, he re-

quested his friend Hopkinson to write a song whose spirit would be wholly American. The result was *Hail Columbia*, which Mr. Fox sang on the night of April 28, 1798, to the tune of *The President's March*, accompanied by a full band and assisted by a large chorus. The tune known as *The President's March* was composed in 1789 by Franklin Fyles, an orchestra leader of New York, and was dedicated to President Washington. Owing to the political unrest of the period, *Hail Columbia* became very popular at the time of its introduction, and has still a certain vogue, more because of its spirit of patriotism than any poetic merit. The first stanza follows:

Hail, Columbia! happy land!  
Hail, ye heroes! heaven-born band!  
Who fought and bled in Freedom's cause,  
Who fought and bled in Freedom's cause,  
And when the storm of war was gone,  
Enjoyed the peace your valor won.  
Let independence be our boast,  
Ever mindful what it cost;  
Ever grateful for the prize,  
Let its altar reach the skies.

**HAIPHONG**, *hi' fawng*. See FRENCH INDO-CHINA (Hanoi).

**HAIR**, an outgrowth from the skin, which covers the bodies of mammals and varies from softest down to the coarse, stiff quills of the porcupine or the bristles of the hog. Whales have the fewest hairs of all mammals. Some specimens have only two hairs. As a body covering, the hair of mammals corresponds to the feathers of birds and the scales of reptiles, though entirely different in structure. Among human beings, hair grows most abundantly on the head, where it serves as a protection and as an ornament. The very fine, short, downy hair that is found distributed over the body, except on the palms of the hands and the soles of the feet, is doubtless a relic of the shaggy covering of primitive man. Civilized beings have made clothes serve for warmth and protection.

For its weight and bulk, hair is the strongest and most elastic material known. That of animals has many economic uses. The hair of the horse and ox, for instance, is used in upholstering, the short hair being manufactured into curled hair for stuffing, and the long, straight hair being made into haircloth for seating. Horsehair also furnishes bristles for brushes and material for sewing the skin together after surgical operations. The fur of a large number of animals, the wool of sheep and several species of goat, and the hair of camels, are all of great value to man, who has learned how to utilize them in making clothing.

**The Structure of a Hair.** On the outside, a hair is covered by a layer of fine scales that overlap like the tiles of a roof, but with the free ends turned upward. This external part

is called the *cuticle*. Beneath is a thicker layer of horny cells of the *epidermis*, or outer layer of the skin; these cells form delicate fibers that are closely packed together and usually occupy the whole inside of the hair.

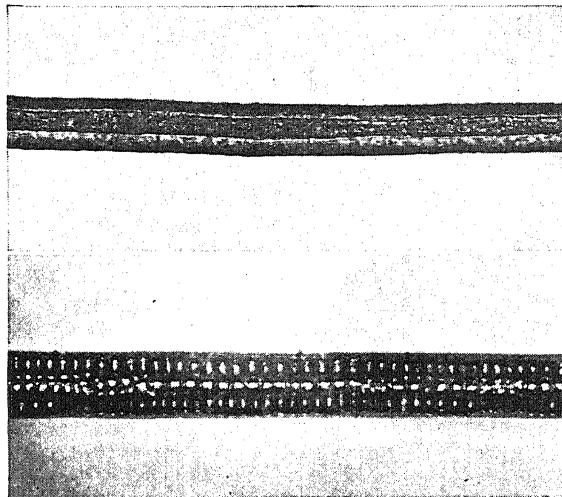
A hair consists of two parts, the root and the shaft. The latter is the part outside the skin, or the free end. Though usually the shaft is rounded, in some persons and races it is flattened. Because of the unequal growths at the different angles, flattened hair has a tendency to curl. The kinky hair of colored people is as flat as a ribbon. The root, which is shaped like a pear, extends down into a pocket-like sac, or hair *follicle*, on the bottom of which is a small projection called a *papilla*. This papilla is supplied with blood vessels, which furnish the material necessary for the growth of the hair.

#### How Hair Grows.

It is by production and growth of cells from the surface of the papilla that hair is formed. It grows, then, from the roots, and not from the ends. As new cells develop, they push forward the old ones, which become a part of the shaft.

Hair will grow as long as the follicle and papilla are not destroyed. The life of a hair is from two to four years, and when an old one falls out, a new one takes its place. Until after the prime of life and under normal health conditions, there is a constant renewal of the supply. Baldness is generally caused by lessened circulation of the blood in the scalp or by certain forms of scalp conditions, such as dandruff, which kill the sources of nourishment and growth. It is also due to neglect of the scalp.

**Color of the Hair.** In the horny cells is deposited the coloring matter, or pigment, which gives the hair its particular color—brown, black, reddish, etc. For the production of coloring matter, it is necessary that the whole body be in a good state of health. Age, illness, worry, and sorrow lessen the secretion of pigment and cause the hair to turn gray or white, and there are cases on record of hair turning white in a single night. In older hairs, also, air spaces sometimes form, and these, by reflecting the light, produce a grayish effect.



UNDER THE MICROSCOPE

Above, hair from a camel. Below, rabbit hair.

**Why Hair "Stands on End."** In Shakespeare's *Hamlet*, the ghost of Hamlet's father tells his son that, if he were not forbidden to do so, he could unfold a tale that would make "each particular hair to stand on end like quills upon the fretful porcupine." This is a sensation everyone has experienced, and it is due to the contraction of tiny muscles that run out in a slanting direction from the hair follicles. These muscles are likely to contract when a sensation of chilliness is felt, or when sudden fright or other mental shock is experienced. For the same reason, the fur bristles up on the back of a frightened cat.

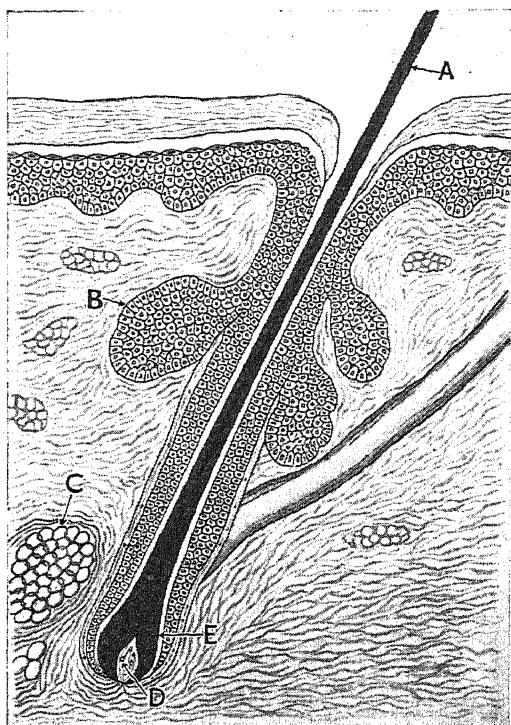
**Care of the Hair.** Opening into the follicles from the sides are tiny glands that produce an oily substance which keeps the hair soft and flexible. Frequent brushing helps to keep it in good condition by distributing the oil through it, and brushing also keeps the hair and scalp free from accu-

mulations of oily waste matter and skin scales. A moderately stiff, flexible bristle brush is preferable to a wire brush, as the latter will scratch and irritate the scalp and is apt to pull the hair out. Unhealthy conditions of hair and scalp are readily transmitted; therefore everyone should have his own comb and brush, and these should be kept *scrupulously* clean.

Long hair should be washed about twice a month and short hair once a week. It is not necessary to use "patent" shampoos, for an excellent and harmless wash can be made from warm water and a pure soap. The hair should always be rinsed thoroughly, for particles of soap left in it are convenient lodging places for dirt and dust. Hair tonics, pomades, and oils are unnecessary, often harmful, and seldom useful. Cleanliness, care, and common sense are the best tonics. If the hair seems dry and lifeless, it can usually be helped by massaging the scalp with the finger-tips to stimulate the circulation. Massage will also aid in keeping it in good condition.

**Hair Dyes** are preparations for changing the natural color of the hair. Solutions of salts of silver, mercury, lead, and bismuth, all of which darken the hair, and peroxide of hydrogen, which produces a golden tint, are quite widely used. A wash made by

steeping leaves of the henna plant will turn the hair red. The most permanent method of dyeing the hair is to soak it with a solution of sulphide of potassium, and before it is entirely dry, to wet it thoroughly with



GREATLY ENLARGED ROOT OF A HUMAN HAIR

(A) Hair; (B) oil glands; (C) growing cells; (D) papilla (connective tissue which extends into and nourishes the roots of a hair); (E) hair follicle (the depression from which the hair grows).

a solution of nitrate of silver. Such a dye need be renewed only as the new hair comes in. Hair dyeing is at the best unsatisfactory, and many coloring preparations contain poisons that cause disease, or kill or injure the hair.

K.A.E.

**Related Subjects.** Further information relating to the topic will be found in these articles:

|          |          |                   |
|----------|----------|-------------------|
| Baldness | Dandruff | Fur and Fur Trade |
| Bristles | Felt     | Wool              |

**HAIRBELL.** See **BLUEBELL**.

**HAIRCLOTH**, a wiry fabric of cotton, linen, or wool, with a horsehair filling. The hair is taken from the horse's mane, and the width of the fabric is the same as the length of the hair. Haircloth comes in black, gray, and white, and is used for interlinings and for upholstery. Its widths are fifteen, eighteen, and thirty inches.

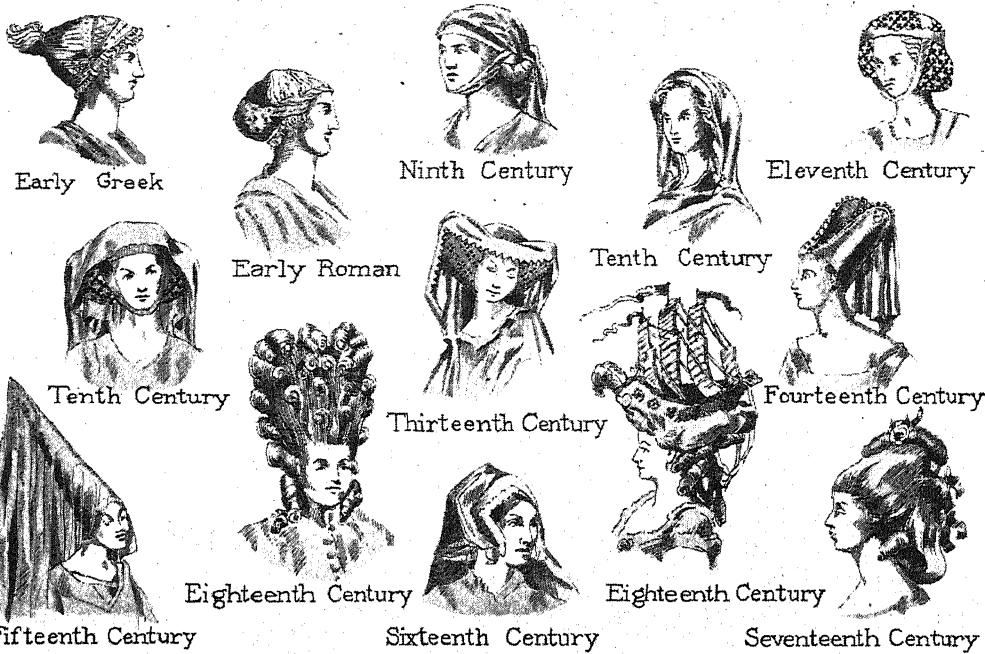
**HAIRDRESSING.** From very remote times, and among all peoples, much care and attention have been devoted to the arrangement of the hair. Examples of ancient art show styles of hairdressing which, in some cases, were intended to be purely ornamental, and in others had some traditional significance and were

designed to indicate the age or rank of the wearer. The Egyptian style was extremely varied, and wigs were in general use. Among the Greeks, in the sixth century B.C., an ornate coiffure was common to both men and women, but in the fifth century, the men wore their hair in its natural curls, or cut very short, while the women followed more elaborate styles. The custom of wearing false hair over plentiful natural hair originated in Asia, and was adopted in Greece, where for a time it was very popular. Prior to about 300 B.C., the Romans, with the exception of warriors and craftsmen, wore long hair. Simple hairdressing was in use among the Roman women until the time of Augustus Caesar, after which more elaborate styles were adopted.

Medieval hairdressing was very simple, but the fourteenth century saw the development of more elaborate fashions. During the fifteenth and sixteenth centuries, the men wore their hair rolled back from their foreheads in a manner suggestive of the pompadour of a later period. Their beards were treated with some stiffening substance and curled so as to radiate in a fanlike manner. The women of the period ornamented their great volume of curled hair by a broad cushion, or coronet. The introduction of long, curled wigs appears to have been due to the desire of the courtiers of Louis XIV to imitate his naturally long and abundant hair. The use of wigs was well established about 1650, and from that time, for at least a century, dressing of the natural hair for men was dispensed with. The coiffure of women during a part of this period was extremely becoming. The curled hair, falling on the neck and bare shoulders, was covered with a crape veil. The close of the seventeenth century saw the introduction of the tall head-dresses of lace and stiffened muslin. In the beginning of the reign of Louis XVI, hairdressing reached a hitherto unknown degree of fantastic extravagance, and in 1750 women wore a huge edifice of curls, supported by stiffening devices, and surmounted by a little hat or cap. One style prevailed in which this hat was replaced by a model of a ship of war.

These extremes were gradually abolished, and in the nineteenth century, short hair and a less elaborate style of arranging it were in vogue among the men. Women also wore their hair very simply, allowing it to fall at the sides in a mass of curls, and confining it at the back of the head with a ribbon. Later, the side curls were dispensed with, and the hair was arranged on the top of the head. At this time, the style known as the *chignon* was introduced. This consisted of an arrangement of the hair over a large roll, or cushion. Within the present century, the false-hair industry has suffered a marked decline, owing to the prevailing simplicity of coiffures and the popu-

# 2000 YEARS of HAIR DRESSING



larity of bobbed hair. About 1928 the "bob," in turn, gave way, to some extent, to longer hair, worn in a simple coil.

Among the Moki Indians of the Southwestern United States, until very recently, as soon as a girl reached the marriageable age she dressed her hair fantastically in two round knobs above the ears; this style she continued until she became a wife (see illustration, under HOPI).

**Origin of the Marcel Wave.** This popular type of wave, which displaced the round curl and frizzes of former days, was invented by a Frenchman named Marcel. He practiced tracing the undulations in his mother's hair, which was naturally curly, and found that



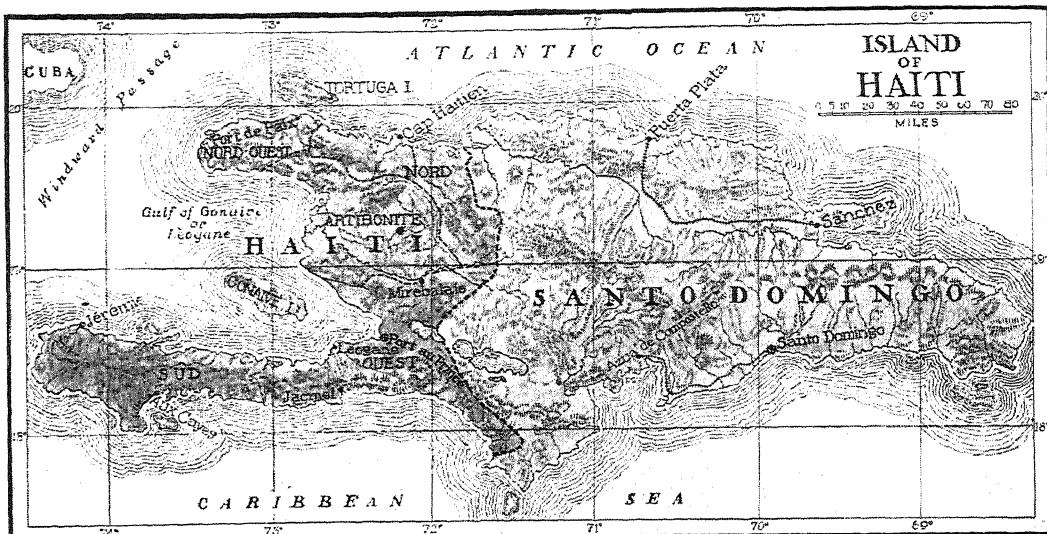
A PRESENT-DAY DEVELOPMENT

The bobbed hair of the second decade of the twentieth century, a very notable departure from the styles shown above.

he could reproduce the same effect on straight hair. He used a specially grooved iron, and obtained the flat effect by holding the grooved part of the iron on the under part of the hair, and guiding the hair with a comb. The round curl is made by simply winding the hair around the heated iron.

**HAIRWORM**, a long, threadlike worm often seen in fresh-water ponds or in ditches by the roadside after a rainstorm. Hairworms look so much like horse-hairs that many children and sometimes adults believe that they are hairs of horses come to life. The eggs of these worms are deposited in slender strings twisted around the stems of water plants. The young worm swims about un-

Photo: U & U



THE ISLAND AND THE TWO REPUBLICS

til it finds the larva of a water insect, into which it bores to begin the life of a parasite. It may remain in the larva's body until full grown, or may reach maturity in the body of a fish or insect that has itself swallowed the first host. The adult worms are often found tangled up into knots; hence the genus to which the different species belong is called *Gordius*, with reference to the *Gordian knot* (which see). For classification see Zoölogy (Divisions of the Animal World). S.H.S.

**HAIRY BEAR.** See BLACK MOUNTAINS; NORTH CAROLINA (The Land).

**HAITI**, *ha' te*, an island of the West Indies, and, next to Cuba, the largest of that group. It lies almost in the middle of the chain of the West Indies, between Porto Rico and Cuba; from the latter it is separated by the Windward Passage, fifty miles in breadth. Although Haiti is an island with a total area of 28,249 square miles, it is divided into two political divisions—the republic of Haiti on the west, with an area of 10,204 square miles, and the republic of Santo Domingo on the east.

[For details of the eastern republic, see the article SANTO DOMINGO. Haiti, as the word is used here, refers to the republic.]

**General Characteristics.** The surface is mountainous and heavily forested with several varieties of valuable hardwood trees. Two

westward peninsulas, enclosing the Gulf of Gonaïves, are formed by mountain chains, which run from east to west. Numerous small rivers drain the land, few of which are navigable except by small boats. The Artibonite, flowing west into the Bay of Gonaïves, is navigable for 100 miles. During the rainy season, which lasts from May to October, the rainfall is excessive, but on the whole the climate is healthful. The annual average temperature is about 90° F., and the thermometer seldom registers below 75° on the low-lying portions of the island. Hurricanes are frequent, but not so violent as in some others of the West Indies.

**The People, Their Education and Religion.** The majority of the population are negroes; only about ten per cent are mulattoes, and these are descended from early French settlers. Some Haitians are white people who are descendants of naturalized Europeans. Estimates of population differ greatly; reliable authorities reported in 1924 about 2,500,000 inhabitants, excluding about 3,000 white foreign residents and military forces of the United States. Although the official language is French—in



Photo, U &amp; U

## A LAD WHO WORKS

A Haitian boy carrying his wares to market.

the native tongue a French dialect known as Creole French—the English language is also widely used.



Photo: U &amp; U

## ASSEMBLING FOR THE VOODOO DANCE

In the interior of Haiti, this form of superstition and sorcery is still practiced. In its most violent forms, human life is taken during the ceremonies, but in Haiti, United States marines stopped this sacrifice.

While the system of education is improving, there is still much to be desired. Elementary education is free, and since 1910 it has been compulsory, but, especially in rural districts, the system is still very imperfect. In 1921 the University of Haiti was founded, and in 1924 a normal training school for women teachers was established. There are about 1,000 schools, with 75,000 pupils enrolled. Although the people have made considerable progress within recent years, they are still in a state of general ignorance; superstition prevails, and the mystic rites of voodoo are practiced. The Roman Catholic faith has been the nominal state religion since 1869.

**The Cities.** There is only one city in the republic of Haiti which has a population of over 100,000, and that is Port-au-Prince. Three other towns between 10,000 and 20,000 are Cap Haitien on the north coast, and Jacmel and Aux Cayes, on the south side of the island.

**Port-au-Prince**, *pohr toh prans'*, or *pohr toh prins'*, the capital and principal seaport of the republic, is situated on the western coast of the island, and has an excellent harbor in the well-sheltered Bay of Gonavives. The town is built on a low, marshy shore at the foot of the hills surrounding the bay, and although it has wide, regular streets, the buildings are very poor. Most of them are of wood, and many are in ruins from earthquakes and fires, which twice in two hundred years have practically destroyed the town. After the withdrawal of the French, who founded the town in 1740, until the United States intervened in

affairs in the island, the country was so mismanaged that the commerce greatly decreased, and the city shared in this misfortune. Since the American intervention, the city has changed from one of dilapidation and ruin to a prosperous town of 125,000 people. Most notable is the improvement in sanitary conditions, which has eliminated much of the disease of former years. There are many new buildings; chief among these are the new university and a presidential palace. Port-au-Prince is of greatest importance as the chief shipping center of Haiti. A railroad connecting Port-au-Prince with Artibonite Valley was completed in 1927. There is cable connection to Cuba, thence to the United States.

**Resources.** The soil of the island is very fertile, but agriculture in general remains in a primitive state. Coffee has been most highly cultivated, and is the most valuable export. Cotton, cacao, tobacco, rice, arrowroot, manioc, sugar cane, and many varieties of tropical fruits and flowers grow in great abundance. All vegetables found in temperate climates are also successfully cultivated. The possibilities for agricultural development are almost unlimited, and a department of the government, known as the Bureau Technique, has been established, whose members are trained agriculturists and are introducing modern methods and machinery. Efforts at establishing the pineapple and sisal industries are being made, and some progress has been accomplished in the sugar industry. In many cases, foreign capital is responsible for this development,

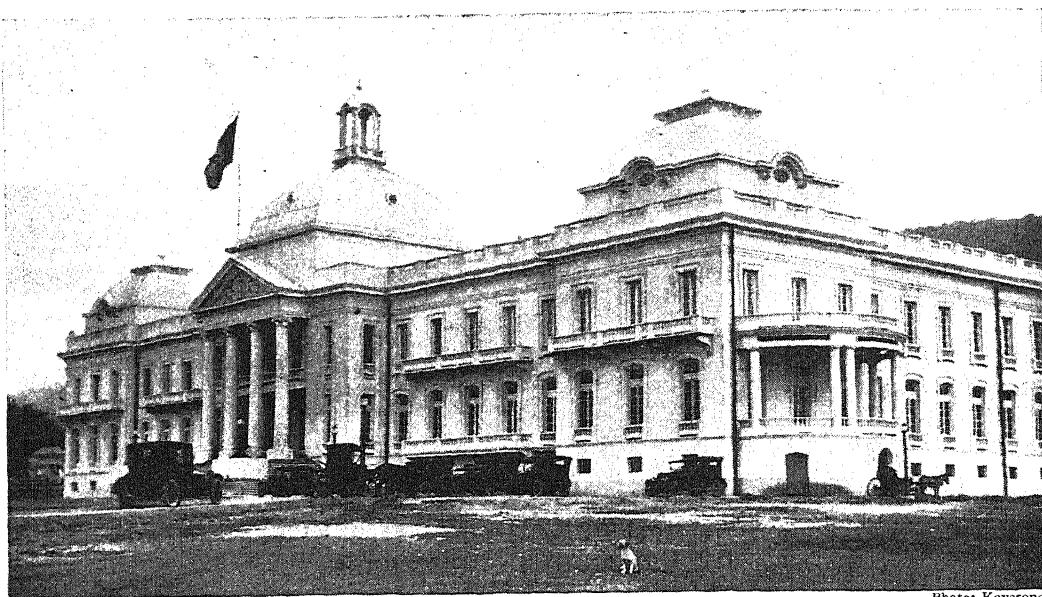


Photo: Keystone

THE PRESIDENTIAL PALACE AT PORT-AU-PRINCE

and is buying land from the peasants for large plantations.

The extensive forests contain valuable woods, such as mahogany, satinwood, rosewood, cedar, and logwood. On the mountains, oaks and pines are found. Logwood is one of the most important exports. The mineral wealth is great, but is as yet almost undeveloped. Iron, silver, gold, copper, tin, and platinum are found, and will provide good fields for future investment. The surrounding waters abound in fish; wild hogs, which furnish an important food supply, roam the forests and marshes.

Seventy-five per cent of the country's income comes from the export of coffee; and cotton, sugar, and logwood are also important. The greater part of the export trade is with France. The country imports cotton, iron, and steel goods.

**Government.** The republic of Haiti is the first state to be constitutionally governed by negroes. The experiment, if it can be called such, has been fairly successful, but corruption at intervals has done much to prevent any great achievements, and revolutions have been of frequent occurrence. The Constitution, language, laws, and traditions of Haiti are of French origin. Haiti has had many constitutions from the time of its proclamation of independence, in 1804, to the present governing Constitution, which was ratified in 1918. Pending the election of a Senate and a Chamber of Deputies, for which the Constitution provides, the legislative and executive powers are exercised by a Council of State composed of twenty-one members appointed by the President. According to amendments to the

Constitution voted in 1928, the President is to be elected henceforth for a period of six years, and is not eligible for reëlection.

**History.** From the time of its discovery by Columbus, in 1492, Haiti has been a political storm center. It was then inhabited by about 2,000,000 Indians, most of whom were later exterminated by the Spaniards. Slaves were imported from Africa as early as 1512, and their descendants now occupy the island. In the sixteenth century, companies of English, French, and Spanish settled there, or made it their headquarters while they carried on piratical expeditions among the neighboring islands. In 1697 the western part of the island, now the republic of Haiti, was ceded to France.

The colony flourished, but, at the time of the French Revolution, the negroes and mulattoes took advantage of dissension among the white population, and a revolt began in 1791. After the French Convention had given freedom to the blacks in 1793, and the British had made their first attempts at invading Haiti, Toussaint L'Ouverture (which see) became leader of the blacks, drove out the British, and became practically an independent governor of the island. After his defeat and deportation, by General Leclerc, one of his former lieutenants, Jean Jacques Dessalines, finally succeeded in expelling the French, and proclaimed Haiti independent in 1804.

From the time that the French were driven from the island until the present, the history of the republic has been a series of insurrections and internal dissensions. In 1914 a revolution occurred, during which the President of the republic was deposed, and his place



Photo: U &amp; U

A VILLAGE STREET

taken by the leader of the revolutionists. This President was assassinated July 28, 1915, and a state of anarchy existed in the republic until troops were sent by the government of the United States to restore order. The American naval officers were forced to assume control of the customs department, to bring order to the finances of the republic. They also took charge of most of the administrative functions, but were able to maintain the Haitian governmental organizations intact. A virtual protectorate of the United States over Haiti was established by treaty in 1915, by which American advisers were appointed for most governmental departments, except courts.

One of the chief aims of the treaty, renewed at its expiration for another ten years, was to establish a permanent peace, which meant that the Haitians must learn to maintain their own peace. In order to accomplish this, a national constabulary of 2,500 men for both towns and country was organized, and a school for training of officers was established. The police and fire departments were likewise modernized. So great was the success of the organizations that the possibilities for revolution are becoming more and more remote. When, in 1922, the President peacefully attended the inauguration of his successor, the event marked the second time in the 115 years of Haiti's history as a republic that a President has been able to complete his term of office.

With peace established and a stable form of government realized, a task largely accomplished by 1921, financial and economic development was possible. The financial reform

succeeded in reducing the enormous national debt from \$36,000,000 in 1915 to less than \$20,000,000 in 1927. The revenue comes almost entirely from customs duties. The great increase in the value of exports was due largely to the modernization of the country under auspices of the United States.

Haiti officials appealed to the United States to send marines to restore order after later political dissensions, and in 1922 the American government complied with the request, with the result that troops are still in the island. In 1930 President Hoover sent a committee of investigation to inquire into the situation.

The surplus in the national budget, a result of the financial policy, made possible further national development. While prior to 1915 there was not an automobile in the republic, motor cars are now common, and there are over 650 miles of newly constructed motor roads. Neglected bridges and roads have been rebuilt. About sixty miles of railroad have also been built. Aside from the development in communication, which makes for understanding and peace between districts, many other modern improvements have been installed. A determined reform in sanitary conditions was instigated, and ten modern hospitals were added to the three or four already established. Free dispensaries are being established in rural districts, in many cases giving the people their first contact with medicine and surgery, and traveling physicians hold clinics at regular places. Taxes now go to the government, instead of into the coffers of greedy revolutionist leaders.

R.L.

**Related Subjects.** The following articles in these volumes, even when they do not deal specifically with Haiti, will throw light on the history and the life of the republic

|                       |               |
|-----------------------|---------------|
| Cocoa                 | Santo Domingo |
| Coffee                | Sugar Cane    |
| Columbus, Christopher | Tobacco       |
| Cotton                | Toussaint,    |
| Mulatto               | L'Ouverture   |

**HAJJ**, *haj*, a variant of Hadj (which see). See, also, MECCA.

**HAKE.** Two different groups of fish are known as hakes, though all are related to the cods. The fish listed as hake in the reports of the United States Bureau of Fisheries are two closely allied species called *squirrel hake* and *white hake*. They are numerous on the ocean bottom from Cape Hatteras to Labrador, and are sometimes used commercially for "boneless cod" and corning. Their air bladders are valued by manufacturers of isinglass and glue. The so-called *silver hake*, or *whiting*, of New England, belongs to the group of true hakes, along with the *European hake* and the *California hake*. The whiting attains an average weight of one to one and one-half pounds, and a length of one foot. Its habits are much like those of the cod (which see). It preys greedily on smaller fish, especially herring. Its flesh is eaten both fresh and dried. L.H.

**Scientific Names.** The squirrel and white hakes are known, respectively, as *Urophycis chuss* and *U. tenuis*. The true hakes are species of *Merluccius*. The whiting is *M. bilinearis*.

**HAKIM**, *hah' kim*, one of the Caliphs. See DRUSES.

**HAKLUYT**, *hak' loot*, RICHARD (1553-1616), an English geographer and historian. In 1588 he published the results of more than 200 voyages of discovery, made by daring men throughout the centuries. His *Voyages* were republished in twelve volumes in 1903-1905. A society by his name was organized in London, in 1846, for printing his unpublished voyages; over a hundred volumes already have made their appearance.

**HALCYON**, *hal' se on*, an old name for the kingfisher, a bird of the grebe family, which lays its eggs in nests which are really floating islands made of plant stems, grass, and reeds (see KINGFISHER). In folklore or fable this bird was said to have the power of quieting the winds during the time of incubation. The term *halcyon days* arose from this fancy, and is used to denote the seven days preceding and the seven following the shortest day of the year, because calm and beautiful weather generally prevails at this period. The poet Bret Harte applies the term in the following lines:

Thou bring'st me back the halcyon days  
Of grateful rest, the week of leisure.

**HALDANE**, RICHARD BURDON, first Viscount (1856-1928), one of the most influential

statesmen of his day. Lord Haldane was twice Lord Chancellor (1912-1915, 1924), Minister of War (1905), chairman of the Royal Commission on University Education in London (1910), chairman of the Committee on Imperial Defense (1924), and member of the Committee of Civil Research (1925). He was created Viscount of Cloan in 1911, and in 1915 was awarded the Order of Merit.

As a representative of the Cabinet, he attended in 1912 a disarmament conference in Berlin. A German university education, yearly Easter visits to Germany, and the friendship of intellectual Germans had fitted Lord Haldane to act as mediator between his country and the Germany he loved so well. His efforts were entirely misunderstood, and during the World War, capital was made of his German affiliations. Often he was the subject of hysterical and scurrilous attacks from press and public. Alone and deserted, he discovered with happy surprise that at least one man remembered his services as Minister of War, when he had reorganized the army and made its effectiveness during the World War possible. Sir Douglas Haig was the man, and he presented a volume of his dispatches to Lord Haldane, with an appreciative inscription.

Before the war, Haldane had been a liberal imperialist, but as the character of the Liberal party changed, he found himself in sympathy with the aspirations of the Labour party, and became a member of it. When the Labour party came into power, in 1924, he was appointed Lord Chancellor.

Between 1915 and 1924, while out of politics, he devoted himself to the great interest of his youth—philosophy. He wrote a masterly presentation, *The Reign of Relativity*, in 1921, and the *Philosophy of Humanism*, in 1922. Einstein, while in England lecturing, visited Haldane, and was presented by him to an enthusiastic London audience. Lord Haldane's lofty ideals and clear thinking were felt in the fields of jurisprudence, education, and industry. In 1928 he published his autobiography, a document remarkable for its serenity and lack of animosity. He had nothing to say about the events leading up to the war, for that subject had been covered in a slender volume, *Before the War*. But with humor and keen insight, he describes his compatriots, Asquith, Grey, MacDonald, and others.

He died in 1928 in Cloan, Perthshire, Scotland, where he had been born seventy-two years before, and where he had spent a happy youth with his brothers and sisters. One brother became a distinguished biologist, another a philosopher-physicist, and his sister became widely known as a translator of Hegel.

**HALDIMAND**, SIR FREDERICK (1718-1791), a Swiss soldier of fortune and British colonial administrator, who held important commands

in America during the French and Indian Wars and the Revolutionary War, and was Governor-General of British North America from 1778 to 1784. He entered the British service in 1756, and held various commands in America until shortly after the beginning of the Revolutionary War, when he was recalled to London to act as the government's adviser on American affairs. Later, as Governor-General, he kept a firm hand on affairs, and, according to French-Canadian historians, a harsh hand on the sympathizers with the rebelling colonists. More important was the encouragement and help he gave to thousands of United Empire Loyalists (which see). Haldimand's efforts were largely responsible for the successful settlement of these people in Canada.

**HALE, EDWARD EVERETT** (1823-1909). In the boyhood home of this brilliant American clergyman, the literary taste which was afterward shown in his work was a part of the very atmosphere. His father, Nathan Hale, was the first editor of the *Boston Daily Advertiser*; Edward Hale, one of the most accomplished of American orators, and Nathan Hale, the patriot and martyr, were of the same family. At an early age, young Hale learned to set type and to perform the other necessary kinds of work in a printing office. He wrote youthful tales and printed them, and for a time issued a small newspaper, *The Public Informer*, for circulation among his relatives and neighbors. At the age of thirteen, he entered Harvard College, where he

made an enviable record as a student. While in college, he wrote a book review for the *Advertiser* which his father published after striking out all the "verys." He had said that the book was very much needed, very well done, and very handsomely printed. The desirability of avoiding unnecessary exaggeration was so impressed upon the young man's mind that he handed down that suggestion to hundreds of aspiring authors during his later years. After graduation in 1839, Hale spent several years studying theology privately, while teaching in the Boston Latin school. In 1842 he began the active work of the ministry in Worcester, Mass.

He accepted a call to the South Congregational Church in Boston in 1856, and continued



Photo: Brown Bros.

**EDWARD EVERETT HALE**  
One of the best loved of New England's notable group of literary men.

as its minister for forty-five years. When the War of Secession began, the issues involved made a strong appeal to him. His sympathies were deeply stirred, and he felt that the perpetuity of the Union was at stake. When it appeared that war was unavoidable, Hale joined a drill club and prepared to take his full part in the event. Notwithstanding his enthusiasm, the whole course of affairs seemed to him deplorable. In one of his letters, written in 1861, he says: "The whole thing fills me with unutterable sadness. But if we come out of it a nation, it is worth something."

He continued to carry on the work of his parish, but devoted much time to writing stories and articles calculated to inspire the people with patriotism. He was an active member of the Sanitary Commission, the Freedman's Aid, and the Soldiers' Memorial Society, and busied himself with many duties which his observation showed him were essential to the well-being of both the soldiers and the public. For the last six years of his life, as chaplain of the United States Senate, he was a notable figure at the nation's capital.

**As a Writer.** Besides a long list of magazine articles, Hale was the author of over fifty books. He wrote histories, essays, novels, poems, and short stories of a helpful kind. He was influential in advancing many reforms and progressive movements, and was an earnest advocate of universal peace and the arbitration, by a supreme court, of all international disputes. His books *Ten Times One Is Ten* and *In His Name* led to the founding of the King's Daughters, Lend-a-Hand, and other charitable clubs. His masterpiece is *The Man Without a Country*. Among his other important writings are *Philip Nolan's Friends*, *The Story of Massachusetts*, *A New England Boyhood*, *Memoirs of a Hundred Years*, and *Lowell and His Friends*.

**The Man Without a Country.** The central figure of this story was a young army officer who, during the War of 1812, was tried by court-martial for an offense, and upon being asked if he wished to say anything to show that he had always been faithful to the United States, cried out in a fit of frenzy, "Damn the United States! I wish I may never hear of the United States again!" The military court ordered that he should be sent out to sea and kept there, where he would never hear the name of the United States again. He was put on board ship, and instructions were issued that no one should convey to him any news, or mention the United States in his presence. He was transferred from one ship to another as the vessels neared the United States, and in this way he was kept out of sight and hearing of his country for many years. On his deathbed he begged for news from home, and requested that a stone be set up in his memory, bearing this inscription:

In Memory of  
**PHILIP NOLAN,**  
Lieutenant of the Army of the United States.  
He loved his country as no other man has loved her;  
but no man deserved less at her hands.

The story was accepted in such sober faith that, in a later edition, the author felt obliged to state in

an appendix that it was not founded on fact. The last utterances of Nolan constitute an eloquent oration that many a student has recited in oratorial contests.

**HALE, JOHN P.** See PIERCE, FRANKLIN.

**HALE, NATHAN** (1755-1776), an American patriot of the Revolutionary period, who suffered the fate of a spy and faced death with a courage that has made him one of his country's noblest heroes. Nathan Hale was born on June 6, 1755, at Coventry, Conn. He was teaching school at New London when the colonists of Concord and Lexington "fired the shot heard 'round the world." In the following July, he joined a Connecticut regiment of volunteers, with the rank of first lieutenant. In January, 1776, he was commissioned a captain in the regular army, and was assigned to duty in the vicinity of New York City.

On Washington's call for a volunteer to enter the British lines to secure needed information, Hale offered his services. In the disguise of a Dutch schoolmaster, he visited all the enemy's camps in New York and Long Island, made drawings of the fortifications, and obtained the facts he sought. On the night of September 21, just as he was planning to return, he was recognized and captured, and the following morning suffered the shameful but inevitable fate of a spy, by dying on the scaffold. His farewell letters to his mother and the young woman he was to marry were destroyed before his eyes, and it is said that his captors refused to send for a clergyman or to permit him to see a Bible. Bravely facing death, the young hero uttered at the last words that will ever be an inspiration to young Americans: "I only regret that I have but one life to lose for my country."

In City Hall Park, New York City, probably near the spot where he lost his life, a beautiful statue, designed by Frederick MacMonnies, has been erected to the memory of Nathan Hale. The city of Hartford, Conn., has honored him with a like memorial.

**HALE, SARAH JOSEPHA.** See THANKSGIVING DAY (Later History).

**HALEB**, native form of *Aleppo*. See SYRIA (The Cities).

**HALÉVY, ah lay vē**, LUDOVIC (1834-1908), a French novelist and dramatist, who wrote, in connection with Henri Meilhac, the serious though sensational drama *Frou-Frou*, in 1869. This was one of the greatest theatrical successes of the century. Halévy was born

in Paris and first achieved fame as part author of the librettos for Offenbach's light operas, such as *La belle Hélène*, *La barbe bleue*, and *La Périchole*. These, as well as many farces, were the joint work of Meilhac and Halévy; from a literary point of view their best work is *Tricoche et Cacolet* and *La boule*. Of Halévy's novels written by himself alone, *L'Abbé Constantin* and *Criquette* are best known. In 1884 he was elected to the French Academy, was previously made Chevalier of the Legion of Honor, and became Commander in 1900.

**HALF-BREEDS** (in politics). See GARDFIELD, JAMES ABRAM (Election of 1880).

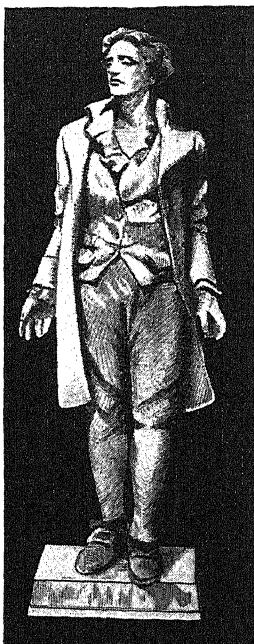
**HALF MOON.** See HUDSON, HENRY.

**HALFTONE**, a process of photo-engraving for reproducing drawings, paintings, photographs, and the like. Halftones are extensively used in the illustration of books, magazines, and newspapers. A zinc etching (which see) will reproduce solid masses of black or white, and will show separate lines, but it will not show gradations of tone; in a zinc etching everything is either black or white. A halftone takes its name from the fact that it does actually show the middle or half tones of a picture. This is accomplished by means of a glass screen.

If a halftone is examined with a magnifying glass, it will be seen to be a mass of tiny dots, which are caused by the screen. A piece of the finest sheet glass is covered with a varnish of wax and asphalt, and is then ruled diagonally with minute lines; the number of lines may be as many as 200 to the inch, but is usually not over 120 to 150. The greater the number of lines, the finer will be the resulting halftone. The ruling is done by an automatic machine carrying a

diamond-pointed graver, or cutter. The plate is treated with hydrofluoric acid, which eats or bites into the lines where the graver has scraped away the varnish. The lines are later filled with an opaque coloring matter which is hardened in the plate by baking in an oven. Another plate similarly prepared is then cemented to the first plate in such a way that the lines on one are at right angles to the lines on the other. The two plates thus form a screen, in which the transparent parts are separated by tiny dots and occupy about one-third of the entire surface. Depending on the number of lines to the inch, this plate is called a 100-, 133-, 150- or, perhaps, a 200-line screen.

A photograph of the picture or object to be reproduced is taken through the ruled screen,



NATHAN HALE  
[Statue by MacMonnies,  
in New York City.]



## LIGHTS AND SHADOWS IN A HALFTONE

The small photograph in the center is enlarged and the resulting black and white etching is shown below. Above is a photograph of the surface of the lower plate.

which is placed at a proper distance in front of a sensitive plate. When the plate has been exposed, the result is a photographic negative, composed of rows of small dots at regular intervals. The dots are uniform in intensity of color, but vary in size according to the relative high lights and shadows of the original. After the negative is developed, a print from it is made on a copper plate, which has been specially prepared with a coating of fish glue, albumin, water, and bichromate of ammonia. Where the dots on the photographic negative allow light to pass through, this mixture will harden, and the rest of the coating is then washed off in water. The plate is etched in an acid bath, but the acid affects only those parts which are not protected by the hardened fish glue and albumin.

The etching of a halftone requires great skill, and several bitings are usually necessary before the plate shows the proper gradations of tone.

An indefinite number of electroplates (see ELECTROPLATING) can be made from the original halftone. The halftone or the electroplates can be placed on a press, either with or without type matter. A halftone requires a very smooth (highly finished) paper for good results.

G.S.T.C.

**HALIBURTON, THOMAS CHANDLER** (1796-1865). See CANADIAN LITERATURE (English Canada).

**HALIBUT**, one of the largest and most important of the flatfishes. Its name, derived from *holy*, refers to its former extensive use as food on holy days. The halibut is a member of the flounder family, and has the characteristic flat body, with the eyes on the same side of the head (see FLATFISH; FLOUNDER). It is a cold-water fish, and, like others of its kind, has the eyes on the right side, which is a dark brown. The left side is white, an arrangement reversed in warm-water flatfish. Halibut are found in all sea waters north of San Francisco, New York, and Havre, France. They are among the largest of true fishes; female specimens weighing 300 to 400 pounds have been





Photo: Canadian Air Force

## THE GREAT HARBOR OF HALIFAX

caught, but the males rarely weigh over fifty pounds. A fish seventy-five or eighty pounds in weight is said to have the best flavor. These fish are gradually moving out to sea, and are now found in greatest numbers on the outer edges of offshore banks, or in deep places between these banks. They feed voraciously on cod, mackerel, mackerel, and numerous other fish.

Halibut are caught with strong hooks and lines, haul seines, pound nets, and trawls. The most important fishing grounds in North America are the waters near Puget Sound and Alaska, the Newfoundland Grand Banks, Western Bank, and the waters of Iceland and

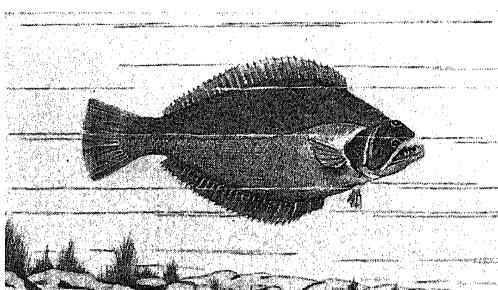
Atlantic. The unshed eggs, or roe, are also in demand. See FISH (Deep-Sea Fisheries). L.H.

**Scientific Name.** The common halibut is *Hippoglossus hippoglossus*.

**HALICARNASSUS, MAUSOLEUM AT.** See SEVEN WONDERS OF THE ANCIENT WORLD.

**HALIFAX**, the capital of Nova Scotia, the county seat of Halifax County, the largest city of the Maritime Provinces, and the second greatest seaport on the Atlantic Ocean, whose harbor is never closed by ice. The city lies on the east coast of the Nova Scotia peninsula, about midway between Cape Canso, at the north end, and Cape Sable, at the south. Its latitude is slightly lower than that of Montreal. By the shortest rail lines, Halifax is 730 miles northeast of Boston. Population, 1921, 58,372; of the city and county, about 100,000.

**General Description.** Halifax lies on both of the slopes of a hill which forms a small peninsula in Halifax harbor. The summit of the hill is 260 feet above the sea. The city has been a fortress since its foundation in 1749. It is popularly ranked in Canada as second in strength to Quebec. Halifax is not merely the chief naval station in British North America, but it is a center of trade and industry. It handles practically all of Nova Scotia's foreign trade, and in winter, when the Saint Lawrence is closed by ice, also has the trade of Montreal and Quebec. It is a railway cen-



FORM OF THE HALIBUT

Greenland. Halibut flesh has a mild, pleasant flavor, and keeps so well on ice that refrigerator cars bring cargoes of fish from the Pacific to the

ter of considerable importance, being the terminus of the Canadian National, Halifax & Eastern, Canadian Pacific, Halifax & Southwestern, and Dominion Atlantic railways. The city harbor is one of the finest in the world. It is about six miles long and one mile wide, and has deep anchorage. To the north it is connected by a narrow channel with Bedford Basin, six miles long and four miles wide, and deep enough for the greatest ships afloat. McNab's Island, lying across the mouth of the harbor, divides it into two entrance channels.

For many years, the railway terminal piers were located on the north water front, but under a new organization, these are on the south water front. The landing quay is over 2,000 feet long, and each of the six piers about 1,250 feet long by 360 feet wide, with deep basins 360 feet wide.

**Industries.** Halifax, besides its large trade in apples, fish, lumber, and other products of Nova Scotia, is important as a manufacturing center. Its chief industrial establishments are iron foundries, machine shops, a cordage works, the largest sugar refinery in Canada, and a large plant for building steel ships.

**Institutions.** Among the public buildings are the provincial Parliament buildings, government house, postoffice, customhouse, and city hall. Also noteworthy are Victoria General Hospital, Nova Scotia Technical College, Convent of the Sacred Heart, and the splendid new buildings of Dalhousie University. Among other educational institutions are Saint Mary's College, the Halifax Ladies' College and Conservatory of Music, schools for the blind and deaf, Presbyterian and Catholic theological schools, and the Royal Naval College of Canada.

Halifax is the seat of the Anglican archbishop of Nova Scotia and the Roman Catholic archbishop of Halifax, and the cathedrals of these two are imposing structures. The new civic park on the northwest arm, with its massive memorial tower, commemorates the origin here, in 1758, of the British colonial system of representative government.

**History.** Halifax was founded by the British in 1749 as a rival to the French fortress of Louisburg (which see). It was named for George Montagu, Earl of Halifax (1716-1771), who was at that time president of the British Board of Trade. Halifax was an uncle to Lord North, who played so important a part in the affairs of England a few years later. The ancient citadel of the fortress remains, but there is also a ring of a dozen forts to guard the city. In 1750 Halifax supplanted Annapolis as the capital of the colony. During the Revolutionary War, it was an important supply base for the British; in the War of 1812, an outfitting point for privateers; and during the American War of Secession, it was frequented by Confederate blockade-runners. It was garrisoned by British troops until 1906, when the responsibility for defense was assumed by the Canadian government. In its harbor, in 1917,

a French steamer carrying T. N. T. collided with a Norwegian relief ship, causing an explosion that devastated one-tenth of the city area.

**HALITE.** See SALT.

**HALITOSIS**, *hal e toh' sis*. See BREATH AND BREATHING (Bad Breath).

**HALL**, ASAPH (1829-1907), an American astronomer noted for his study of double stars, and also for the discovery of two moons of the planet Mars, which he named Deimos and Phobos. For this latter achievement, the Royal Astronomical Society presented him with a gold medal. Hall was born in Goshen, Conn. He became a carpenter, but entered Central College in McGrawville, N. Y., in 1854, and later attended the University of Michigan. From 1863 until 1891, he was in government service, teaching mathematics in the Naval Observatory at Washington, and leading astronomical expeditions, notably to Bering Strait, Vladivostok, Siberia, and Colorado. He retired with the rank of captain.

In 1895 he was appointed professor of astronomy at Harvard University, where he remained six years. In 1875 he was elected a member of the National Academy of Science, and was made president of the American Association for the Advancement of Science in 1902.

**HALL**, G[RANVILLE] STANLEY (1845-1924), an American educator and psychologist, the first president of Clark University, Worcester, Mass.

He was born in Massachusetts, and was educated at Williams College and in Germany. Beginning his teaching career in 1872, as professor of psychology at Antioch College, Ohio, Hall became instructor in English at Harvard in 1876, and two years later finished a postgraduate course there. In 1881 he became professor of psychology at Johns Hopkins University, where he remained until his election to the presidency of Clark University in 1888. In this university he also filled the chair of psychology. See CLARK UNIVERSITY.

President Hall was one of the notable leaders in adapting methods of instruction to the facts of evolutionary and experimental psychology, and he was an authority in the field of child development.

**Literary Interests.** Professor Hall was the founder and the editor of the *American Journal of Psychology*,



G. STANLEY HALL

the *Pedagogical Seminary*, the *American Journal of Religious Psychology and Education*, and the *Journal of Race Development*. Among his publications are *The Contents of Children's Minds on Entering School; Adolescence; Youth, Its Education, Regimen, and Hygiene; Educational Problems; Founders of Modern Psychology; Jesus the Christ, in the Light of Psychology; The Supreme Standard of Life and Conduct; Recreations of a Psychologist; Senescence*.

**HALLAM, hal' am**, HENRY (1777-1859), an English historian whose great work, *The Middle Ages*, was published in 1818. His sense of proportion and admirable arrangement are shown in his histories of France, Italy, Spain, Germany, and of the Greeks and Saracens. His logical arrangement of facts was due, no doubt, to his legal training. He was born at Windsor, studied law at Christ College, Oxford, and practiced law on the Oxford circuit for several years. He numbered among his friends Sidney Smith, Macaulay, and Lord Tennyson. Tennyson's *In Memoriam* was written as a tribute of his friendship for Hallam's son Arthur, who died suddenly at the age of twenty-two. In 1830 Hallam and Washington Irving received medals offered by King George IV for distinction in historical writings.

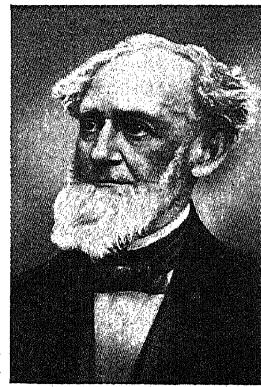
**Historical Output.** Among Hallam's works, in addition to *The Middle Ages*, are the *Constitutional History of England from the Accession of Henry VII to the Death of George II*, and the *Introduction to the Literature of Europe in the Fifteenth, Sixteenth, and Seventeenth Centuries*.

**HALLE, hah' le.**  
See GERMANY (Principal Cities).

**HALLECK, hal' ek, FITZ-GREENE** (1790-1867), an American writer of verse whose chief claim to fame rests upon one patriotic poem, *Marco Bozzaris*. He was born in Guilford, Conn. He became a clerk in a New York bank, after which, for a long period, he was the confidential agent of John Jacob Astor and was named by him one of the original trustees of the Astor Library. In 1819 Hal-



HENRY HALLAM



FITZ-GREENE HALLECK

leck collaborated with Joseph Rodman Drake in the humorous series of *Croaker Papers*, which appeared in the *New York Evening Post*. Drake's death in 1819 inspired Halleck's most beautiful poem, beginning "Green be the turf above thee."

**Other Writings.** These include *Fanny*, a satire on the follies, fashions, and celebrities of the day; *Alnwick Castle*, *Burns*, and *Marco Bozzaris*. See BOZZARIS, MARCO.

**HALLEY, hal' ie**, EDMUND (1656-1742), an English astronomer, the first to forecast the date of a return of a comet, a prediction verified by subsequent visits of the comet that bears his name. After graduating from Queen's College, Oxford, he went to Saint Helena and spent two years in the island, compiling a catalog of the stars of the southern hemisphere, which was published in 1678. He was later sent on a scientific expedition to the Pacific Ocean, but his crew mutinied and compelled him to return before his work was completed. Halley finished his task in a second expedition and was given the rank of captain in the British navy, with half pay for life. In 1703 he was appointed professor of geometry at Oxford, and devoted much of his time to compiling

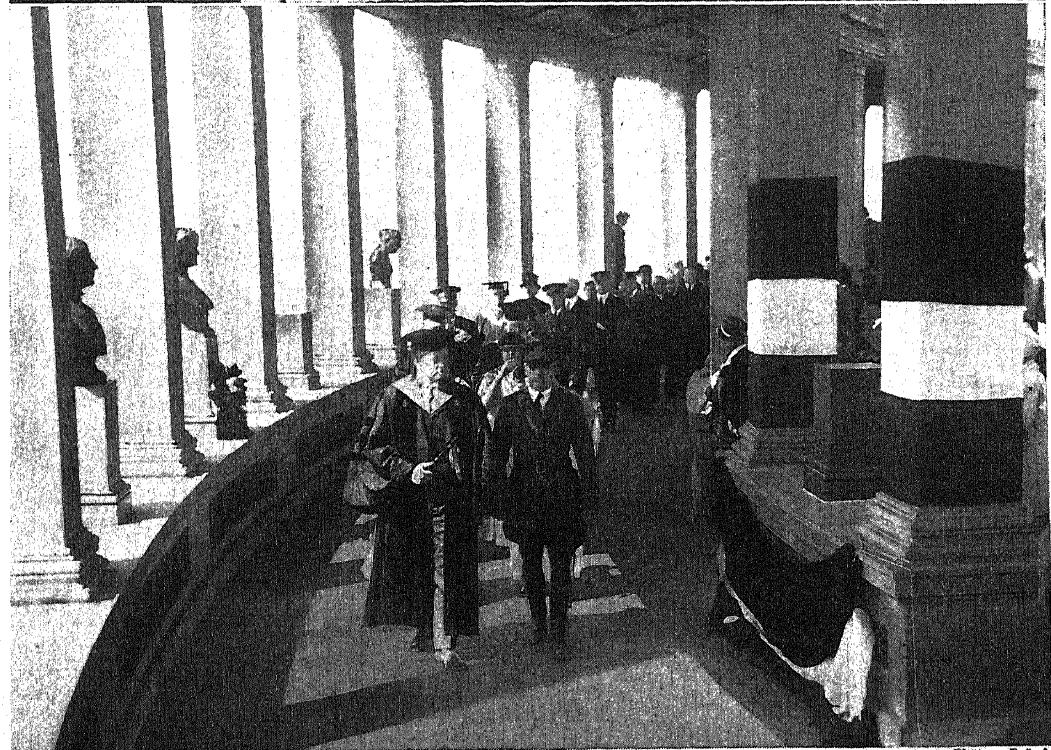
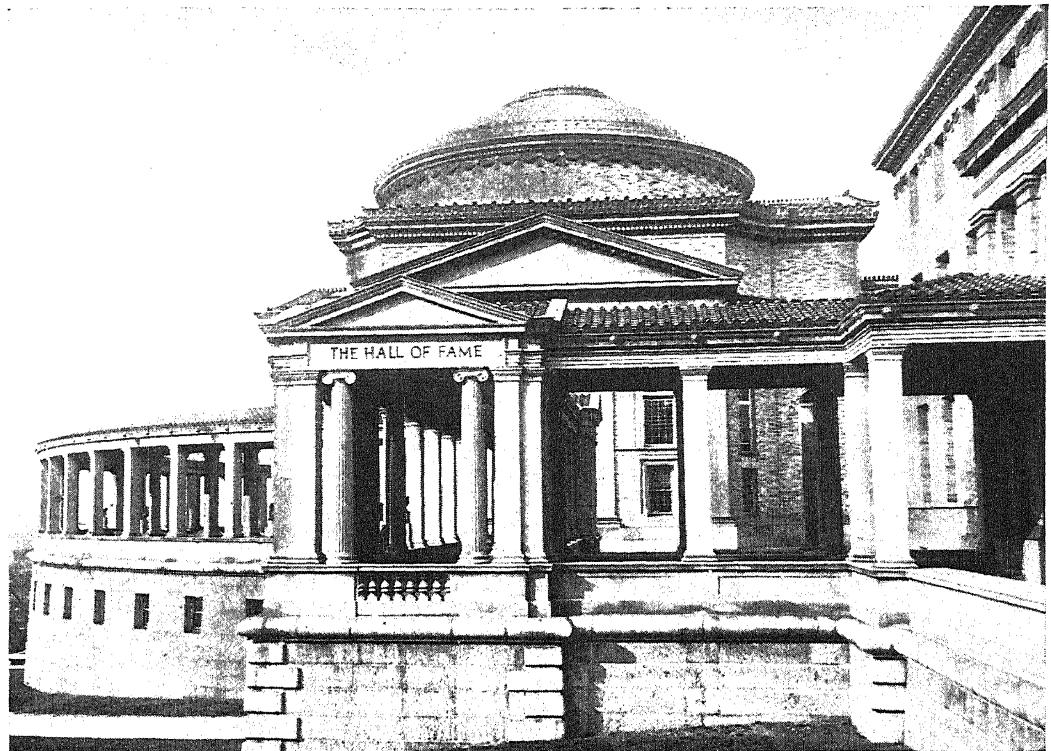


EDMUND HALLEY

the results of his researches on the orbits of comets. He became secretary of the Royal Society in 1713 and Astronomer Royal in 1721.

**Halley's Comet.** This comet, named after Edmund Halley, was rediscovered in 1682, when it was visible for about a month. Records showed that it had been observed previously, in 1456, 1531, and 1607. Halley said that it would return at regular intervals, and it is a proof of the correctness of his calculations that the comet reappeared in 1759, 1835, and 1910. Scientists declare that this comet travels 3,200,000,-000 miles beyond the sun, and that its tail is many million miles long. It comes in sight once in nearly sixty-six years, being next due in 1986. See COMET.

**HALL MARK**, the official mark of an assay office upon gold or silver coins, bullion, and other articles, to indicate purity; also, a symbol or mark adopted by a city or country. A *lion passant*, also called the *standard mark*, is the hall mark of England. Glasgow has the *lion rampant* for its mark. The term *plate mark* is also used by silversmiths and goldsmiths. The word *hall mark* is used figuratively in such expressions as "He has the hall mark of a true artist."



Photos: P & A

**They Live in Hearts They Leave Behind.** The Hall of Fame, and a procession preceding an unveiling.  
Ah, who can tell how hard it is to climb  
The steep where Fame's proud temple shines afar.—BEATTIE.

**HALL OF COLUMNS.** See EGYPT (Ancient Cities: Thebes); SETI I.

**HALL OF FAME**, a semicircular building of granite erected in 1900 as a memorial to famous Americans, on the grounds of the New York University, overlooking the Harlem River. It was established by a gift of \$250,000, and consists of a museum of seven rooms on the ground floor, with a colonnade above, which is over 400 feet in length. Along the colonnade are 150 panels, in which the picture and the name and dates of birth and death of each person elected to a place in the Hall are to be placed. In 1900 fifty names were to be chosen, and afterward others were to be selected at the rate of five every five years; according to this plan, by the end of the century the 150 panels would be filled. The election of members to grace the Hall of Fame is in charge of the University Senate. The nominations of the public are invited, and these are submitted to a board of one hundred judges, chosen from all the states. Only names of persons who have been dead twenty-five years or more may be considered, and two-thirds of the votes are necessary to a choice. The names approved by the hundred judges are then voted upon by the University Senate.

At first, only Americans born in the United States were eligible, but in 1904 a plan was announced to add a room with space for thirty panels, in which the pictures of foreign-born Americans could be placed. In 1900, of the 252 names submitted, only twenty-nine (see list below) received the required number of votes. The vacancies were to be taken care of in ensuing elections. The list chosen in 1900 follows:

|                     |                     |
|---------------------|---------------------|
| George Washington   | Nathaniel Hawthorne |
| Abraham Lincoln     | George Peabody      |
| Daniel Webster      | Peter Cooper        |
| Benjamin Franklin   | Robert E. Lee       |
| Ulysses S. Grant    | Eli Whitney         |
| John Marshall       | John J. Audubon     |
| Thomas Jefferson    | Horace Mann         |
| Ralph Waldo Emerson | Henry Ward Beecher  |
| Robert Fulton       | James Kent          |
| Henry W. Longfellow | Joseph Story        |
| Washington Irving   | John Adams          |
| Jonathan Edwards    | William E. Channing |
| Samuel F. B. Morse  | Gilbert Stuart      |
| David G. Farragut   | Asa Gray            |
| Henry Clay          |                     |

In 1905 the following were added:

|                    |                    |
|--------------------|--------------------|
| John Q. Adams      | Alexander Hamilton |
| James R. Lowell    | Louis Agassiz      |
| William T. Sherman | Mary Lyon          |
| James Madison      | Emma Willard       |
| John G. Whittier   | Maria Mitchell     |

In 1910 these were added:

|                       |                    |
|-----------------------|--------------------|
| Harriet Beecher Stowe | William C. Bryant  |
| Oliver W. Holmes      | Frances E. Willard |
| Edgar A. Poe          | Andrew Jackson     |
| James F. Cooper       | George Bancroft    |
| Phillips Brooks       | John L. Motley     |

In 1915 seven new names were added:

|                 |                   |
|-----------------|-------------------|
| Mark Hopkins    | Charlotte Cushman |
| Francis Parkman | Rufus Choate      |
| Elias Howe      | Daniel Boone      |
| Joseph Henry    |                   |

In 1920 seven were added:

|                      |                      |
|----------------------|----------------------|
| Mark Twain           | Patrick Henry        |
| James B. Eads        | Roger Williams       |
| Wm. T. G. Morton     | Alice Freeman Palmer |
| Augustus St. Gaudens |                      |

In 1925 two were added, no other names having received the required number of votes:

|             |                 |
|-------------|-----------------|
| Edwin Booth | John Paul Jones |
|-------------|-----------------|

[See illustration, page 3021.]

**HALLOWE'EN**, *hal o een'*, or **HALLOW-EVEN**, the evening of October 31, for young people a time for gayety and pranks, a night to play at being witches, ghosts, and fairies. That evening is so called because it is the eve of the Christian festival of *All Saints*, which falls on November 1. The name means *Holy Eve*, and commemorates a time which was originally set apart, as Lowell expresses it in his poem, *All Saints*, to honor the memory of—

All Saints—the unknown good that rest

In God's still memory folded deep.

The bravely dumb who did their deed,

And scorned to blot it with a name;

Men of the plain heroic breed,

That loved Heaven's silence more than fame.

The building of bonfires, cracking of nuts, bobbing for apples floating in tubs of water, and telling of fortunes and ghost stories, which are now Hallowe'en customs, are all relics of paganism. About thirteen centuries ago, pagans celebrated November 1 as *All Spirits' Day*, when spirits, both good and evil, were believed to be on earth. The Druids also celebrated their harvest festival about that time, and many strange ceremonies were performed. Even after the pagans adopted Christianity, they still observed many of their old customs, including those which have survived as the Hallowe'en diversions of to-day. In past years the ceremonies peculiar to the occasion in Scotland were of a highly superstitious nature, and Burns humorously described them in his poem, *Hallowe'en*. See illustration and program on page 3023.

**HALLSTATT**, *hahl' shtah't*, AUSTRIA, the location of a necropolis of the Bronze Age. See **NECROPOLIS**.

**HALLUCINATION**, *hal lu se na' shun*, a mental state in which a person is certain that he sees, hears, or otherwise perceives something which does not actually exist (see **PERCEPTION**). That is, the object which seems to stimulate the organs of sense is only imagined. Hallucinations are frequently experienced by those laboring under severe mental strain, and they are common in cases of intoxication and insanity. Normal persons, however, often hear

voices and see visions in the drowsy interval between waking and sleeping.

Hallucination usually comes through the sense of hearing; sight is next in order; and then follow smell, taste, and touch. Probably everyone has experienced the common hallucination of hearing the striking of a clock or the sounds of musical instruments. A well-known historic example of hallucination may be found in the experience of Joan of Arc, the French peasant girl, who was inspired by heavenly voices and visions to save her country from the power of the English (see JOAN OF ARC).

Hallucination should not be confused with *illusion*, though the two mental states are closely related. In the latter case, the person perceives something that has reality, but does not see, or interpret, it correctly. A common example of illusion is the feeling of motion experienced by one sitting in a train which is not moving, when another train passes on a neighboring track (in this connection, see the article EINSTEIN'S THEORY).

Hallucinations, being effects rather than causes, cannot be treated medically. Physicians seek the basis of the disorder, and, if that can be cured, hallucinations cease. C.E.S.

**HALO**, a word derived from the Greek name for a thrashing floor on which oxen, going round and round, trod a circular path. It is now applied in astronomy to luminous rings round the sun and moon. Three of these circles of light are sometimes seen surrounding the sun. Halos are probably formed by the refraction of light from particles of ice, and are most common in Arctic regions. In addition to the circle, a cross is sometimes seen, stretching beyond the limits of the halo, and on the bands of the cross occur parhelias, or mock suns. The band round the sun and moon is generally colored red on the inside, tapering off into orange, yellow, and white at the edges. Coronas, sometimes called halos, are not really such, and are due to different causes. See CORONA; PARHELION; NIMBUS.

**In Art.** The halo is much used in art as an emblem of divinity and of purity or saintliness. Since the fifth century, few pictures of Christ or of a saint have been painted without a luminous circle nearly surrounding the head.

**HALOGENS**, *hal' o jenz*, a group of four non-metallic chemical elements which have the common property of forming salts similar to ocean salt. These chemicals are bromine, chlorine, fluorine, and iodine (see articles under these titles). They combine directly with many other elements, and their chemical compounds have similar properties. The name of the group is from the Greek words meaning *salt-producer*. See CHEMISTRY. T.B.J.

**HALS**, *hahls*, FRANS (about 1580-1666), a Dutch painter, second only to Rembrandt



### Hallowe'en Suggestions

Where the bee sucks there suck I;  
In a cowslip's bell I lie;  
There I couch when owls do cry.  
On the bat's back do I fly.—*Shakespeare*.

There is less of historical and educational interest in connection with this holiday than with most of the special days that are observed in schools, but children find a peculiar fascination in its weird legends and in its time-honored symbols. Since there are so many of these symbols, the day lends itself especially to excellent "busy work." The pupils may make booklets in the shape of pumpkins, black cats, witches' hats, or brooms, and these may serve as invitations to their parents to visit the school. Rows of brownies or fairies may also be cut from white paper and arranged about the top of the blackboards as a border. The following program includes many of the special elements that make the day attractive.

|   |                  |
|---|------------------|
| <i>The Brownie Song</i> .....                   | <i>Gaynor</i>    |
| <i>Fairies of the Cauldron Low</i> .....        | <i>Howitt</i>    |
| <i>The Shoemaker and the Elves</i> .....        | <i>Grimm</i>     |
| <i>The Gifts of the Dwarfs</i> .....            |                  |
| .....   | <i>Craig</i>     |
| <i>The Fairies</i> .....                        | <i>Allingham</i> |
| Dramatization of <i>Cinderella</i>              |                  |
| Reading from <i>Adventures of a Brownie</i>     |                  |
| .....   | <i>Craig</i>     |
| <i>Tam o' Shanter</i> .....                     | <i>Burns</i>     |
| <i>Frau Holle</i> ... See article STORY-TELLING |                  |
| <i>Little Orphant Annie</i> .....               | <i>Riley</i>     |
| <i>Jack o' Lantern Drill</i>                    |                  |



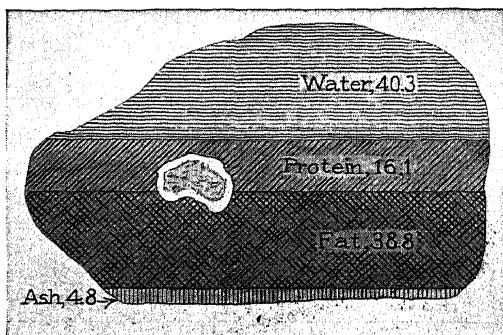
among the portrait painters of Holland. Little is known of his life, except that he lived chiefly in Haarlem, was of dissolute habits, and that during the last years of his life he was saved from hopeless poverty only through a yearly pension granted him by the city. In spite of these disadvantages, he left to posterity some of the greatest portraits of all time. Hals chose as sitters people from all classes of society, but he was especially successful in portraying characters of "low life"—fishwives, street musicians, children of fisher folk, and so on. As a portrayer of faces wreathed in laughter, he has never been equaled, and his subjects of feasting exhibit great vivacity and spirit. Famous, too, are his group pictures of archers and civic guards. It is said that he received more commissions from the guilds and public officials than any other painter of Holland.

In spite of the fact that as a painter Hals was high in the favor of the people of his time, his work brought him little financial return. His pictures were sold for a few shillings or a few pounds—not sufficient to relieve his family of dire poverty. Two centuries elapsed before suitable recognition was accorded to his genius. Early in the present century, more than \$20,000 was paid for a single picture, and a group of his paintings was bought by the National Gallery for \$125,000.

[Representative of his numerous canvases are his *Laughing Cavalier*, *Hille Bobbe*, *Banquet of the Officers of Saint George's Shooting Company*, *William van Heythuyzen*, and *Jolly Trio*.]

**HALTERES**, *hal te' reez*. See DUMB-BELLS.

**HAM**, meat from the thigh of the hog, prepared for the consumer by salting and smoking. Ham is frequently known as lean pork, as distinguished from bacon, which is



#### FOOD VALUE OF HAM

The chart gives the composition of the edible portion of medium-fat smoked ham. This cut has a fuel value of 1,880 calories per pound. Ham is a cold-weather meat, because of its heat-producing qualities.

fat pork. The amount of fat in ham varies considerably, however. The percentage for average lean smoked ham is 20.8; that for

medium fat ham is 38.8. Bacon has about twice as much fat as ham. Because of its agreeable taste and flavor, ham is one of the favorite table meats, fried ham being a staple breakfast dish, and cold boiled ham being equally popular for sandwiches and as a luncheon meat. Baked ham is in wide favor as a dinner meat, and is often served with sweet potatoes and a dressing made of brown sugar and dried bread crumbs, seasoned with cloves.

The curing of ham is an important branch of the meat-packing industry, and it is also a common farm industry. There are two methods of salting, the wet-salting, or pickling, method, and the dry-salting method. By the former, the hams are kept in brine from a month to a month and a half, with occasional renewals of the pickling liquid. The dry-salting method consists in rubbing the meat thoroughly with salt, repeating the process at the end of ten days, and again at the end of another ten days. After the salting, the hams are hung in smoke-houses; a smoldering fire is built beneath the floor, and the smoke ascends to the meat through holes in the flooring. The smoking lasts from twelve to forty-eight hours. The hams are then cooled, wrapped, and, if intended for the market, put in boxes for shipment. The large packers usually have a brand burned in the skin before wrapping. See PORK; MEAT AND MEAT PACKING.

E.V.M.C.

**HAM**, one of the three sons of Noah (which see).

**HAMADRYAD**, *ham' a dri ad*. See BABOON.

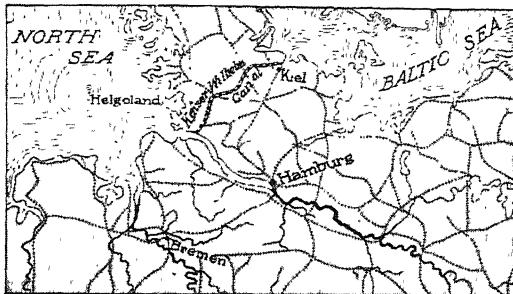
**HAMADRYADS**. See DRYADS; NYMPHS.

**HAMAMELIS**, *ham a me' lis*. See WITCH-HAZEL.

**HAMAN**, *ha' man*, a royal favorite at the court of the despotic Persian king, Ahasuerus (supposed to have been Xerxes I), who promoted him to high rank, where all the princes bowed to his authority. He was of lowly origin, so he felt very much elated when the king, soon after marrying the beautiful Jewess, Esther, honored him. When Mordecai, a cousin and the former guardian of Esther, refused to bow to Haman, the latter became very angry and planned to massacre, not only Mordecai, but all the Jews in the empire (*Esther III*, 8-9). Then Esther, who had kept her nationality a secret, risked her life by revealing it to the king and pleading for her people. The monarch quickly saw the whole nefarious plot, and ordered his servants to hang Haman on the gallows he had prepared for Mordecai. The latter was given high honor, and the Jews were spared. See AHASUERUS; ESTHER.

[The saying, "Hang as high as Haman," arose from the fact that Haman ordered an unusually high gallows built for Mordecai, since it was his intention that people all over the city should see the death of the Jew.]

**HAMBURG** (in German, *hahm' boorK*), next to Berlin the largest city in the German republic, and one of the most important commercial centers of continental Europe. It is situated seventy-five miles from the North Sea port of Cuxhaven, on the northern branch of the River Elbe, and 178 miles northwest of Berlin. The value of its shipping and commerce before the World War was exceeded only by that of London and New York. After



LOCATION OF HAMBURG

a sharp decline during the war, the commerce, industry, and shipping of Hamburg experienced a recovery that gradually brought it to normal conditions.

The city is crossed in all directions by canals, and is also intersected by the River Alster, which forms two large lakes or basins known as the Binnenalster and Aussenalster. More than sixty bridges cross the canals, and two splendid structures span the Elbe. The commercial part of the town is old, and possesses little beauty. The canals are lined by warehouses, to which lighters bring goods from the harbor, which is one of the best equipped in the world. The more modern portion surrounds the two basins of the Alster, and contains many handsome buildings and beautiful promenades. The Church of Saint Nicholas is one of the loftiest churches in the world, with a spire 482 feet high. The University of Hamburg, which was founded in 1919, has over 4,500 students.

Hamburg is one of the largest of the world's coffee markets, and is also among the foremost cities in money-exchange transactions. The principal exports are sugar, coffee, woolen and cotton goods, ironware, machinery, tobacco, and paper. The imports consist chiefly of raw products, such as wool, hides, tobacco, iron, grain, and coffee. One of the principal industries is shipbuilding; the largest vessels of the old German navy were built here. Population, 1925, 1,152,523.

**Hamburg State**, a free state of the German republic, containing the metropolitan district of Hamburg. It has an area of 160 square miles. It lies between Schleswig-Holstein on the north and Hanover on the south, ex-

tending to Cuxhaven at the mouth of the Elbe. Hamburg is a republic governed by a senate and a house of burgesses. In the country districts, the soil is very fertile and produces good crops of rye, barley, wheat, and potatoes. In addition to Hamburg, the chief towns are Bergedorf, with 16,730 inhabitants, and Cuxhaven (Ritzebuttel), with 15,000. The latter became an important naval base at the beginning of the World War. Population of the state, exclusive of the city of Hamburg, 73,397 in 1925.

**HAMELN, OR HAMELIN**, *hah' meln*. See WESER RIVER; PIED PIPER OF HAMELIN.

**HAMILCAR BARCA**, *hah mil' kahr bahr' kah* (270-228 B.C.), a commander in chief of the army of ancient Carthage, whose wonderful military genius prepared the way for the founding of a new empire in Spain by his famous son, Hannibal. While still a young man, Hamilcar Barca was given command of the Carthaginian forces in Sicily, shortly before the close of the First Punic War. Although the Romans were masters of almost the whole island, he conducted war against them with great ability for several years, making Rome fear for the safety of its Italian possessions. In 241 B.C. the Carthaginian admiral, Hanno, was severely defeated, and Hamilcar Barca was compelled to leave Sicily.

After the close of the First Punic War, the Carthaginians determined to repair their losses by new conquests in Spain. In 236 B.C. Hamilcar led the march westward, where for nine years he devoted his commanding genius to organizing the different Iberian tribes into a compact state. His great design of making Spain a point of attack against Rome was carried out by his son-in-law, Hasdrubal, and by his son, Hannibal.

**Related Subjects.** The reader is referred in these volumes to the following articles:

Carthage  
Hannibal

Hasdrubal  
Punic Wars

**HAMILTON**, capital of the Bermuda Islands (which see).

**HAMILTON, ALEXANDER** (1757-1804). This American statesman, the first Secretary of the Treasury, took his seat in Washington's first Cabinet at a time when the treasury of the nation was empty and the government was without credit. How he acquitted himself in the difficult rôle he was called upon to play is summed up in the eloquent words of Daniel Webster:

He smote the rock of the national resources, and abundant streams of revenue gushed forth. He touched the dead corpse of Public Credit, and it sprang upon its feet.

Alexander Hamilton was born at Charles Town, on the island of Nevis in the West Indies, on January 11, 1757. His father, James Hamilton, was a Scottish merchant of

good family, and his mother was Rachael Fawcett, of French Huguenot descent. At the age of sixteen, the boy came to America to complete his education, studying for a year in a grammar school at Elizabethtown, N. J.,

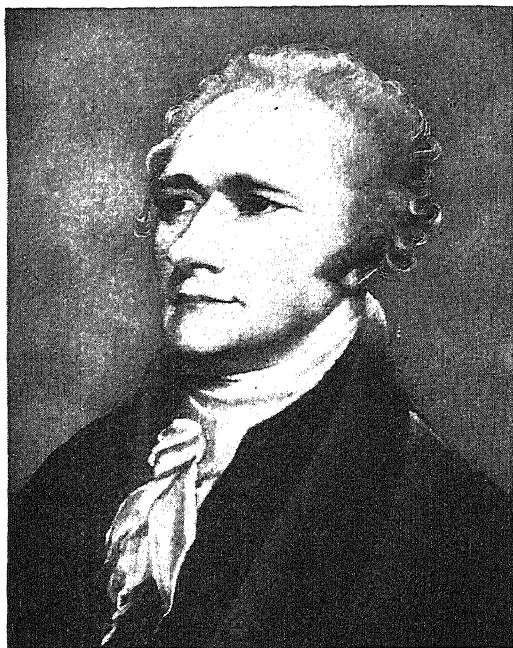


Photo: U &amp; U

ALEXANDER HAMILTON

and then entering King's College (now Columbia University). The struggle of the colonies against England early enlisted his ardent sympathy, and before the opening of hostilities, he published anonymously two remarkable pamphlets in support of the patriot cause. On the outbreak of the Revolution, he joined the colonial forces, and displayed such valor and coolness in Washington's New Jersey campaign of 1776-1777 that the latter raised him to the rank of lieutenant colonel.

After the close of the war, Hamilton took a course in law, and in 1782-1783 represented New York in the Continental Congress. He was keenly alive to the weakness of the government under the Articles of Confederation, and he bore a conspicuous part in the assembling of the Constitutional Convention of 1787, in which he sat as one of the delegates from New York. No one labored more fervently than he for the adoption of the new Constitution; his masterly papers in its support, published in *The Federalist*, and his speeches in the New York convention which ratified it, exerted a tremendous influence in its favor.

In 1789, when the Treasury Department was organized, President Washington appointed Hamilton the first Secretary of the Treasury, and his handling of the nation's financial prob-

lems during his term of office laid the foundation of national prosperity. Through his initiative, the general government agreed to pay the debts incurred by the states during the Revolution; a national bank and mint were established; and national revenues were provided for by means of import duties (see TARIFF) and taxes on certain home products. His financial policy brought him into sharp conflict with Thomas Jefferson, who represented the party opposed to a strongly centralized government, and in 1795 he resigned and took up the practice of law in New York.

Hamilton's influence did not decline with his retirement. He remained a trusted and loyal adviser of Washington, giving him valued support in the trying Jay Treaty crisis, and for the retiring President he wrote the *Farewell Address*. In 1804 he became involved in a political dispute with Aaron Burr and accepted the latter's challenge to a duel, in which he fell mortally wounded. On the monument which has been erected over his grave in Old Trinity Churchyard, New York, one may to-day read this fitting tribute to him: "The patriot of incorruptible integrity; the soldier of approved valor; the statesman of consummate wisdom."

B.M.W.

**Related Subjects.** Knowledge of Alexander Hamilton and of the crises which he was called upon to meet may be increased by consulting the following articles in these volumes:

Articles of Confederation  
Burr, Aaron  
Federalist, The  
Federalist Party

Internal Revenue  
Jay Treaty  
Political Parties  
Treasury Department  
Washington, George

**HAMILTON, MOUNT.** See OBSERVATORY (Lick Observatory).

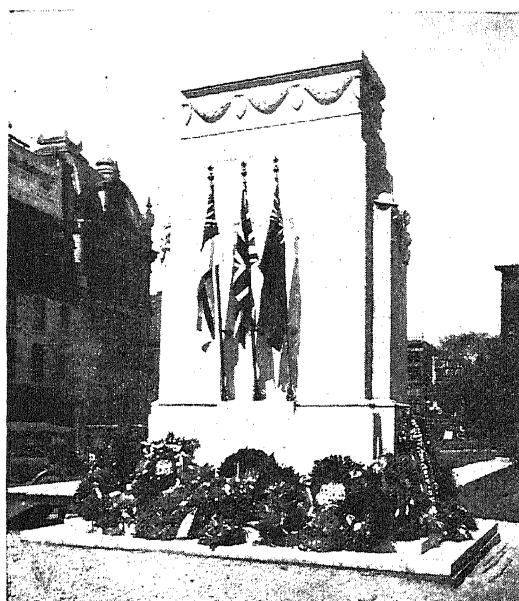
**HAMILTON, OHIO.** See OHIO (back of map).

**HAMILTON, ONT.**, the county seat of Wentworth County, one of the most important manufacturing centers in Canada. In size it is the second city in the province and fifth in the Dominion. It is situated on Burlington Bay, at the western extremity of Lake Ontario, thirty-nine miles southwest of Toronto, by rail. The city is served by the Toronto, Hamilton & Buffalo, the Canadian Pacific, and the Canadian National railways and electric interurban lines, and steamers run to other lake ports. Hamilton is on the main motor highway between Windsor and Montreal, and is a center of various motorbus lines.

The first settlement was made in 1813 by George Hamilton, in honor of whom the place was named; it was incorporated as a city in 1846. Population, 1921, 114,151.

**Industry.** Through its fine shipping facilities, and abundant hydroelectric power developed in the Niagara field, Hamilton has become a manufacturing center; in the value of its manufactures, it ranks third among Canadian cities. There are about 790 industrial plants, the largest of which are the Cana-

dan branches of the International Harvester, Westinghouse Company, and International Steel. There are also factories for making cotton and woolen goods, clothing, glass, elevators, boots, and tobacco products.



HAMILTON'S WAR MEMORIAL

**HAMILTON**, SIR WILLIAM and LADY. See NELSON, HORATIO.

**HAMILTON COLLEGE**. See NEW YORK (Education).

**HAMILTON RIVER**, also known as GRAND RIVER, the greatest river of the Labrador peninsula. Its source is a chain of small lakes, among them Ashuanipi and Atikonak, in the central part of the peninsula. From these lakes issue a number of small streams, which unite to form the Hamilton. About midway to the Atlantic, in its course of 350 miles, the river turns sharply, and instead of running southeast, it turns to the northeast, until it ends in Lake Melville, an extension of Hamilton Inlet.

**Grand Falls**. The Hamilton River is not important for its length or for the basin it drains (20,100 square miles). It is famous, however, for Grand Falls, which occur about 220 miles from the mouth. Here, within a distance of twelve miles, the river drops 760 feet, a series of rapids culminating in a sheer fall over a rocky ledge over 300 feet high. At the falls, the river is 200 feet wide, and the roar of the waters can be heard for twenty miles. Below the falls, the river rushes through a majestic canyon 400 to 500 feet high and about twenty-five miles long. The falls were first seen by white men in 1839, but in the course of half a century, the existence became mythical, and not until 1891, when they were redis-

covered, was accurate knowledge of them again obtained.

**HAMITIC**, *ham it' ik*, RACES. See RACES OF MEN.

**HAMLET**, OR **HAMLETH**, a personage, half mythological and half historical, whom Shakespeare has transformed into one of the most prominent figures in literature. He is the hero of the most famous tragedy of Shakespeare, which follows closely the semi-mythological story of Hamleth. According to the ancient legend, Hamleth was Prince of Jutland; the king, his father, had been murdered by his own brother, Fengo, who took the throne. Hamleth pretended madness to save his life. His mother helped him avenge his father's murder by putting Fengo to death. The reader is referred to the article SHAKESPEARE (Synopsis of the Plays).

**Illustrations**. The reader is referred to pages 1895 and 1896, in the article DENMARK, for historic evidences connected with Hamlet.

**HAMLIN**, HANNIBAL (1809-1891), an American statesman, one of the leaders of the anti-slavery faction for nearly two decades before the War of Secession.

He was active in the organization of the Republican party in 1856, and was the first Vice-President of the United States elected by that party, for he was chosen on the Lincoln ticket in 1860. Hamlin was born in Maine. In 1835 he was admitted to the bar, and two years later began a long political career with election to the Maine legislature, as a Democrat. In 1843 he was sent to Congress, and served in the House of Representatives from 1843 to 1847. From the beginning of his Congressional term, he took a firm stand against slavery, and in 1846 attracted wide attention by introducing into the House the Wilmot Proviso (which see), an anti-slavery measure.

Hamlin was elected to the United States Senate in 1848, to fill a vacancy, and was re-elected for a full term in 1851, but five years later he retired to become governor of Maine. In 1857, however, he returned to the Senate, where he remained until his election to the Vice-Presidency in 1860. From 1869 to 1881 he was again sent to the United States Senate, and from 1881 to 1883 was minister to Spain.

**HAMLINE UNIVERSITY**. See MINNEAPOLIS, MINN.; MINNESOTA (Education).

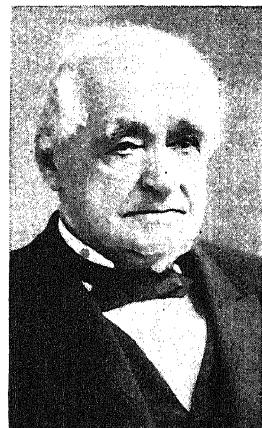


Photo: Brown Bros.

HANNIBAL HAMLIN

**HAMMER**, THROWING THE, a feat of strength and agility that forms an important part of modern athletic contests. The contestant stands within a circle seven feet in diameter, and after swinging the hammer round his head to gain momentum, hurls it as far as possible.



POSITIONS IN HAMMER THROWING

At left, position of the feet at the beginning of the swing; center, beginning of the second turn—well up on the toe; at right, the balance, after letting the hammer fly.

The hammer is a metal ball weighing not more than sixteen pounds; the handle, not more than four feet long, consists of chains or wire ropes with wooden grips for the hands. Much practice is required before one may become an expert. Strength is needed, but it is not so important as control of the muscles, which must work in perfect harmony to produce the highest skill. The record throw for a hammer weighing sixteen pounds is 189 feet and  $6\frac{1}{2}$  inches.

**HAMMERFEST.** See NORWAY (The Cities).

**HAMMERHEAD**, a species of shark (which see).

**HAMMERSTEIN**, *ham' ur stine*, OSCAR (1847-1919), a theatrical and operatic producer. Seven years after he arrived in America from Germany, Oscar Hammerstein had amassed a small fortune which he invested in his first theatrical venture. He was only twenty-three when he took over the old Stadt Theater, in the Bowery. Between 1888 and 1906, he built and managed the Harlem Opera House, the Olympia, Belasco, Victoria, and several other playhouses. He had planned that the Manhattan Opera House, which he opened in 1906, should be used for productions of operas in English. Before the opening night, all plans had been changed, and indications the first night were that the long-established Metropolitan Opera had a formidable rival. Hammerstein introduced brilliant foreign artists, French operas, and the works of modern composers. He engaged Campanini, Melba, Tetrazzini, and other operatic singers, at salaries which were unheard of before his time, and refused to produce trite and hackneyed operas. His venture was a tremendous success as a stimulus to music culture in New York, but a financial failure.

In 1911 Hammerstein was forced to sell his interests to the Metropolitan and to agree not to produce grand opera for ten years, in any territory controlled by his rival. He had sold the Philadelphia Opera House in 1910, two years after he built it. With no business connections in the United States, the impresario sailed for London, where he built the London Opera House and managed it according to his policies at the Manhattan. French opera gained no followers in the British capital, and its sponsor faced another financial catastrophe. Undaunted, Hammerstein returned to New York, built a theater, engaged artists, and prepared for a gala opening in total disregard of the agreement signed less than two years before. The Metropolitan sought legal redress, and the courts ruled that the American Opera House could not be used for operatic productions. The name was changed to Lexington Theater, and theatrical enterprises were shown there. Legal and financial difficulties harassed Hammerstein during the remainder of his life.

Arthur Hammerstein, son of Oscar, is a well-known producer of light operas noted for their charm and finish. *Wildflower*, *Song of the Flame*, and *Rose Marie* had long runs in New York and London. *Rose Marie* was a popular success in other American cities, and was made into a moving picture.

Elaine Hammerstein, granddaughter of Oscar, inherited a love for the theater, and became an actress of ability. She has appeared in moving pictures, as well as on the legitimate stage.

**HAMMOCK**, *ham' uk*, a hanging bed or couch which, to the sailor accustomed to sleeping in it, is comfortable and luxurious, but to the uninitiated is neither pleasant nor especially safe. During the summer season, hammocks of brightly colored, loose-woven cord or hemp are much in evidence on verandas or under trees, but the sailor's hammock is a less ornamental and more substantial affair. The latter is of heavy canvas three feet wide and six feet long, and is swung by cords at the ends to hooks under the deck. In the morning it is taken down, the mattress is rolled up in it, and the whole bundle is stored in a locker. Sometimes when a sailor dies at sea, his body is wrapped in his hammock for burial, and it was to this custom that Tennyson referred when he wrote:

O mother, praying God will save  
Thy sailor—while thy head is bow'd,  
His heavy-shotted hammock-shroud  
Drops in his vast and wandering grave.

In the United States, from year to year, there is an average of six hammock factories, though before the World War there were more than a dozen.

**Derivation.** The natives of Peru first made use of such swinging beds, and it is from their word *hamaca* that the English name is derived.

**HAMMOND**, the family name of a father and son who rose to fame in the fields of science and invention.

**John Hays Hammond, Sr.** (1855- ), an American mining engineer, a native of San Francisco, and a graduate of a mining school in Freiburg, Germany. Early in his career, he became a mining expert on the staff of the Geological Survey, but left public service in 1882 to become a mine superintendent and eventually a consulting engineer. In the latter capacity, his services were in demand by great companies throughout the world.

While in South Africa, he became involved in the Jameson Raid (see JAMESON, LEANDER STARE), and for alleged complicity was sentenced to death by the Boers, but was eventually released upon payment of a fine of \$125,000. Few men have acquired greater interests in mining properties. Hammond has lectured at Harvard, Yale, Johns Hopkins, and Columbia universities, and in 1910 was the special representative of the President of the United States at the coronation of George V, in London. In 1929 he was awarded the highest medal of the American Institute of Mining and Metallurgical Engineers, the third man in its history to receive this distinction.

**John Hays Hammond, Jr.** (1888- ), son of the above, was born in San Francisco and educated at the Sheffield Scientific School of Yale University. Hammond has earned high rank among inventors; on several occasions, the American government has recognized his achievements by adopting his devices. He perfected a wireless-controlled torpedo which is destined to strengthen coast defenses; this was followed by a new system whereby torpedoes could be fired from battleships. New incendiary devices of his were used in the World War.

Among his greatest inventions was one which insures isolation of sender and receiver in the use of radio, by which no other person can "listen in." He holds a large number of patents for inventions in the line of telephony and radio-telegraphy. See RADIO COMMUNICATION.

**HAMMOND**, IND., an industrial suburb of Chicago, Ill., adjoining it on the southeast. It is in Lake County, in the extreme northwestern corner of the state, extending for two miles along the shore of Lake Michigan and for five miles down the Illinois-Indiana state line. The business center of Chicago is eighteen miles northwest.

Hammond was settled in 1868; in 1883 it was organized as a town, and in 1884 received a city charter. Population, 1928, 56,000 (Federal estimate).

**Transportation.** Hammond has the service of all the railway lines approaching Chicago from the east. Interurban lines and motorbus lines connect with Chicago and other cities in Northern Indiana. Shipping facilities are further increased by the operation of six belt lines, by navigation through the Calumet River, which discharges into Lake Michigan at South Chicago, Ill., and by transportation through the Indiana Harbor Canal.

**Industries.** Although Hammond is closely connected with Chicago industrially, it is in itself a city of importance. The development of Hammond began with the establishment of the G. H. Hammond

Company's packing house. This firm was the first in the United States to pack fresh meat for shipment (1869). For a long time the town was known as a packing-house community, but attention has been turned to other branches of industry, and there are now nearly ninety factories. The city has one of the largest manufactories of surgical instruments, a mammoth oil refinery, and one of the largest printing houses in the United States.

R.G.B.

**HAMMURABI**, *hahm oo rah' be* (about 2124- about 2081 B.C.), a king of Babylonia, the sixth ruler of the first dynasty of Babylon. He is renowned as an administrator of unusual skill, and for the code of laws which bears his name. The records of his reign are preserved in numerous inscriptions, which afford a fuller account of this period than that of any other in Babylonian history.

Hammurabi's chief concern was with the administration of justice. He reorganized the courts, and transferred the judicial duties from the priests to elders, who were appointed for life. The code of laws which he formulated was excellent for those times. It attempted to protect the rights and promote the welfare of all classes of the people (see subhead, below).

He also encouraged building enterprises, the construction of granaries and canals, and the development of the financial resources of his kingdom. It was his ambition to exalt righteousness and to rule with justice. History accords him a place as the noblest king of all those who ruled in Babylon. See BABYLONIA.

**Code of Hammurabi.** If we consider the date when the laws of Hammurabi were formulated, their enlightened character must be judged remarkable. The laws were carved on a stone which was discovered in Susa in 1901. There are 282 paragraphs in all, and they deal with personal and property rights. There are none pertaining to religious duties.

Some of the subjects treated are: false testimony, unjust accusation, witchcraft, domestic property, family rights, damage in various trades, rates for various forms of service, loans, deposits, and debts.

In general, the code is noteworthy for its humane provisions. It seeks to provide protection for the weak against the strong, the poor against the rich. There is the occasional prescription of a barbarous penalty, but as a whole, the laws are greatly in advance of the codes of that time.

**HAMPDEN**, JOHN (1594-1643), a British statesman who received the title of "Patriot Hampden" for resisting Charles I's demand for ship money, one form of taxation, after the judges had decided in favor of the king's right to levy. For this defiance he was prosecuted, and he argued his own case against the Crown lawyers for twelve days before the twelve judges. Although the decision was against him by a vote of seven to five, public opinion gave him the victory. Hampden was a member of the Short Parliament and the Long Parliament in 1640, and was one of the five members whom the king attempted to seize in January,

1642. When civil war broke out, he commanded a regiment under the Earl of Essex in the Parliamentary army. In the skirmish on Chalgrove Field, he received a wound and died six days later. See CHARLES (I, England), and other references there named.

**HAMPSHIRE DOWN SHEEP.** See SHEEP (Important Domestic Breeds).

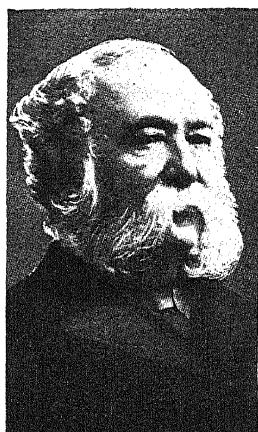
**HAMPTON, WADE** (1818-1902), an American soldier, grandson of General Wade Hampton of Revolutionary fame, was born in Charleston, S. C., in the home of his mother's grandfather; the house still stands, and is marked by a tablet. He was graduated from the University of South Carolina, studied law but never practiced it, and served in both houses of the state legislature. At the outbreak of the War of Secession, he equipped at his own expense a command of Confederate cavalry, infantry, and artillery, known as Hampton's Legion.

He won distinction at Bull Run and Seven Pines, was made brigadier general of cavalry, took part in Lee's northern advance, and fought Sheridan in the Shenandoah Valley. In 1864 he became lieutenant general and assumed command of Lee's entire cavalry forces. In 1865, as commander of Johnston's cavalry, General Hampton made valiant efforts to prevent Sherman's advance northward from Savannah. From 1876 to 1879, he was governor of South Carolina, United States Senator from that state from 1879 to 1891, and United States Commissioner of Railroads from 1893 to 1897. See STATUARY HALL.

**HAMPTON COURT CONFERENCE**, a meeting called in 1604 by James I of England to settle the differences between the Puritan and High Church parties of the Church of England. The conference lasted for three days and resulted in a few trifling changes in the ritual, but entirely failed to bring about the reforms desired by the Puritans, and made their position more difficult. An important indirect result of the conference was that revision of the Bible which is called the *King James, or Authorized, Version* (1611).

**Related Subjects.** The reader is referred in these volumes to the following articles:

|                                   |                    |
|-----------------------------------|--------------------|
| Bible (Accepted English Versions) | James (I, England) |
| Church of England                 | Puritans           |



WADE HAMPTON

**HAMPTON NORMAL AND AGRICULTURAL INSTITUTE**, an undenominational industrial school established at Hampton, Va., in 1868, for the education of negroes and Indians. Its influence on negro education has been noteworthy. From it was graduated Booker T. Washington, the greatest educator of the negro race, himself the founder of a similar institution, and President Robert R. Moton, his successor there. Hampton Institute was opened in 1868 with two teachers and fifteen former slaves as students, under the auspices of the American Missionary Association. Its founder and first superintendent was General Samuel Chapman Armstrong. In 1870 it was granted a state charter. The school is a private corporation, its management being in the hands of a board of seventeen trustees, representing various religious denominations.

Over 1,000 acres of land are owned by the institution, and its 140 buildings include dormitories, recitation halls, the Collis P. Huntington Library, a church, a Y. M. C. A. building, hospital, modern brick barns and silos, a gymnasium, a trade school, a community day school used as a practice school, and a hall for domestic science and agriculture. Carpentry, painting, blacksmithing, tailoring, and other trades are open to boys who are sixteen years of age and over, while the girls are instructed in housework, laundry work, cooking, sewing, methods of teaching, and the fundamentals of agriculture. In connection with a four-year agricultural course, the institution maintains two well-equipped farms. The normal course leads to the degree of bachelor of arts in education.

**Related Subjects.** The reader is referred in these volumes to the articles NEGRO; FISK UNIVERSITY; HOWARD UNIVERSITY; ALABAMA (Education: Tuskegee Normal and Industrial Institute); VIRGINIA (Education).

**HAMPTON ROADS, BATTLE OF.** See WAR OF SECESSION (Battles: Monitor and Merrimac).

**HAMPTON ROADS CONFERENCE**, a famous but fruitless conference in American history, by which an endeavor was made to arrange peace between the North and the South, toward the end of the War of Secession. It was held on February 3, 1865, on board the *River Queen*, at Hampton Roads (see CHESAPEAKE BAY), near Fort Monroe. President Lincoln and Secretary of State Seward represented the United States government. The Confederacy was represented by Vice-President Alexander H. Stephens, Senator Robert M. T. Hunter, and Assistant Secretary of War John A. Campbell. President Lincoln refused to make any treaty with the Confederate government, and declined to consider any peace proposal other than immediate restoration of the Union, the laying down of Confederate

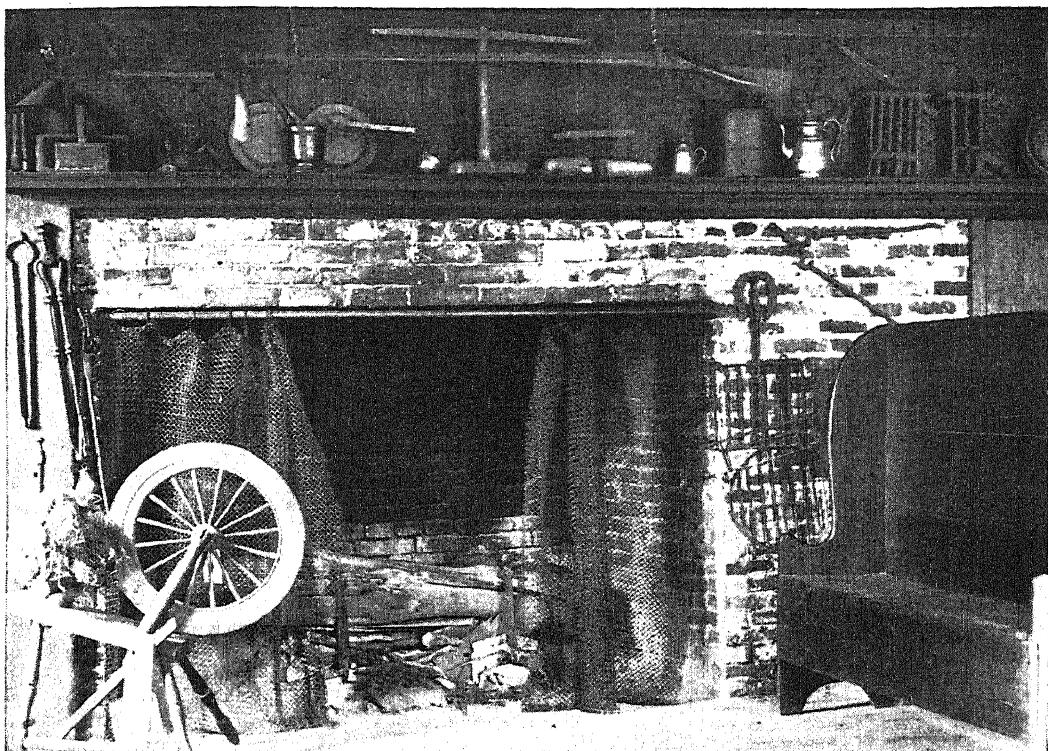


Photo: Keystone

## "THE MOST ROMANTIC HOUSE IN NEW ENGLAND"

John Hancock married the famous Dorothy Quincy. The illustration shows the old kitchen in the Quincy home. Architects and decorators in great numbers visit the house to get ideas on colonial interior decorations. At the right is the old seat where Dorothy sat with the sweetheart who was destined to write his name ahead of all other signers of the Declaration of Independence. (See HANCOCK, JOHN.)

arms, and abolition of slavery. The conference adjourned after four hours of discussion. See WAR OF SECESSION.

**HAMSTER**, a rodent belonging to the same family as the mouse, and having the gopher-like habit of undermining the ground. The hamster is found in Central Asia and over much of Europe. It is larger and stouter than the common rat, and has large cheek pouches and a short, hairy tail. On the under parts it is more or less black, the back is reddish-gray, and there are white spots on the sides and breast. This rodent burrows about three feet deep in dry soil, and constructs chambers with several entrances. Some of these rooms are large enough to hold considerable amounts of corn and seeds, carried by the animal in its cheek pouches. During the winter, it sleeps most of the time in its burrow, but wakens



HAMSTER

About one-tenth actual size.

about February to feed on its previously gathered store. It is very prolific, but is partly kept in check by dogs and foxes. See RODENT.

W.N.H.

**Scientific Name.** The hamster is a member of the family *Muridae*; its scientific name is *Cricetus cricetus*.

**HAMSUN, KNUT**, a Norwegian novelist. See NOBEL PRIZES.

**HAMTRAMCK**, *ham tram' ik*, MICH., a great industrial center which is a part of the metropolitan area of Detroit. See MICHIGAN (back of map).

**HANCOCK, JOHN** (1737-1793), one of the most famous of American patriots of the Revolutionary period. He was President of the Continental Congress from 1775 to 1777, the first signer of the Declaration of Independence, and the first governor of the state of Massachusetts. From the circumstance of his having been the first to sign the Declaration, the expression, "to place one's John Hancock on a paper," meaning, "to sign one's name," has become a part of current speech.

Hancock was born in Braintree, Mass., and educated at Harvard College. From the beginning of the struggle of the colonies against

Great Britain, he took a leading part in defense of American rights, with both voice and pen. The attempt of Governor Gage to arrest



Photo: U &amp; U

JOHN HANCOCK

Hancock and Samuel Adams on a charge of treason was one of the causes of the Battle of Lexington. During the Revolution, as major general of Massachusetts militia, he led the state troops in the Rhode Island expedition of 1778. He served as governor of Massachusetts from 1780 until his death, except in 1785-1786, when he was again a member of the Continental Congress.

An excellent portrait of Hancock, by John S. Copley, is in the Boston Museum of Fine Arts. See DECLARATION OF INDEPENDENCE, and illustration, page 303<sup>1</sup>.

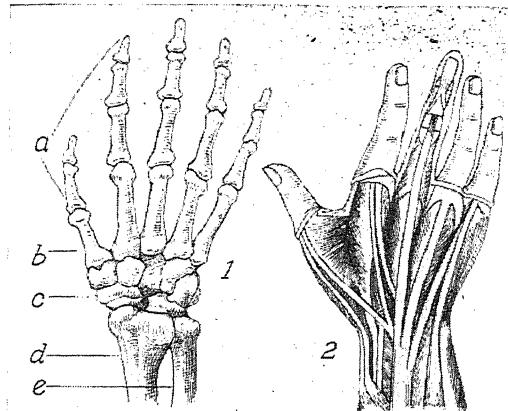
**HANCOCK, WINFIELD SCOTT** (1824-1886), an American general in the War of Secession and in 1880 an unsuccessful candidate for the Presidency of the United States. He was born at Montgomery Square, Pa., was graduated at West Point in 1844, and appointed second lieutenant. He fought in the Mexican War, where he commanded a company, earning the brevet of first lieutenant for services at Churubusco. From 1859 to 1861, Hancock was chief quartermaster of the Southern California district. At the beginning of the War of Secession, he was given a command in the Army of the Potomac, and distinguished himself at Williamsburg, Va., where General McClellan said in his dispatches that Hancock was superb. On December 13, 1862, his command suffered a heavy loss at the Battle of Fredericksburg, but he largely saved the day at the Battle of Chancellorsville. He was wounded at Gettysburg, where he took direct command until the arrival of Meade. In 1867 Hancock was sent to New Orleans to supervise the work of reconstruction in Texas and Louisiana, but was relieved at his own request and assigned to the Atlantic military division on Governor's Island, New York. He was nominated for President of the United States on the Democratic ticket in 1880, but was defeated by Garfield (which see). See, also, MEXICAN WAR, WAR OF SECESSION.

## THE HAND IN ART

(1) The athletic hand, a detail from Michelangelo's *David*. (2) The ascetic hand, from a drawing of "praying hands" by the artist Dürer. (3) *The Secret*, sculptured by Rodin. Although Rodin endowed these hands with the fragile beauty of lilies, they are none the less realistic, under close examination. (See next page.)



**HAND.** It has often been said that with the heart man conceives, with the head he directs, and with the hand he executes. The bony



THE HAND

1. (a) Phalanges; (b) metacarpals; (c) carpals; (d) radius; (e) ulna. 2. White lines indicate extensor muscles. The flexor muscles, the opposite set, occur in the palm. (See illustration, page 3032.)

framework of the hand admirably fits it for the important part it plays in human activity. There are twenty-seven hand bones. The wrist, which joins the hand to the forearm, contains eight *carpal* bones, as follows: *scaphoid*, *semi-lunar*, *cuneiform*, *pisiform*, *trapezium*, *trapezoid*, *os magnum*, *unciform*; there are five long *metacarpal* bones, which lie in the palm. Fourteen slender *phalanges* are found in the fingers and thumb, three in each finger and two in the thumb.

Beginning in the upper part of the forearm are muscles which pass to the bones of the hand, and near the wrist unite with strong, slender cords called *tendons*. These tendons are distributed to the joints of the fingers and thumb. When the muscles are excited to action, they exert a pull on the tendons, which in turn pull on the parts to which they are attached. The fingers can be straightened out or moved and curved into various positions, and the thumb can be made to meet every part of the front of the fingers and can touch them at several places on the back. If it were not for this power of the thumb, it would be difficult to pick up and handle objects. Therefore, in treating an injured hand, the surgeon does everything in his power to save the thumb.

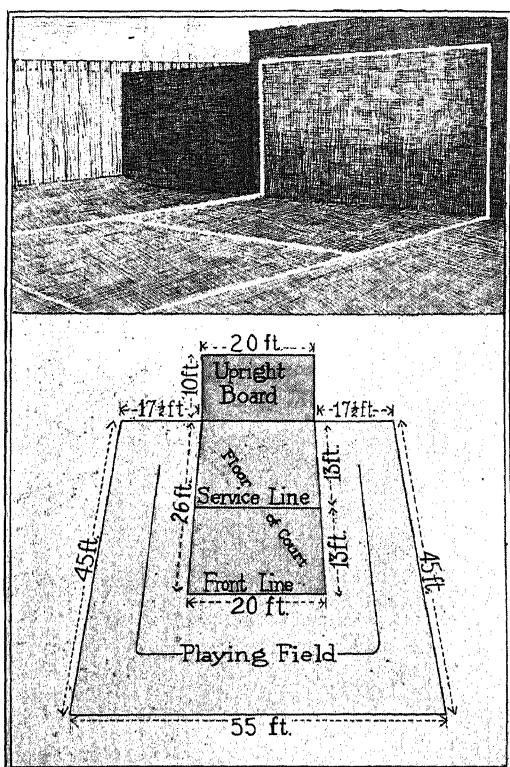
A comparison of the structure of the hand and foot shows that the bones of the hand are more easily moved than those of the foot, and that the latter are the stronger and heavier. The palm of the hand, which corresponds to the under side of the instep, is nearly flat, while the instep is arched. The hand is designed for manipulation, the foot for supporting the weight of the body and to help in walking. The

hand has one more bone in its skeleton than the foot. See ARM: FOOT. K.A.E.

**HANDBALL**, AMERICAN, a spirited game played with an elastic ball which is struck with the gloved hand against a board or wall. Handball has developed from an old Irish game called *four-wall* handball, but it has been so modified and improved that in its present form it is far more scientific than the older sport. Ordinarily, it is played in "singles" or "doubles," meaning by two or four players, but it can be adapted for three persons as well. A good player must use his left hand skilfully.

The Court. A special court is required, consisting of a *floor*, usually of smooth concrete or unglazed gymnasium boarding; a surrounding *field*; and a stationary upright *board*, the latter serving as the rear wall. Court and field boundary lines are marked in red, the *service line* being drawn midway between the front line and the board. The accompanying diagram outlines a correctly planned court.

**How It Is Played.** *The Serve:* The player who begins the game—the *server*—stands within the outer section of the court. Until the ball is put in play, the other players must stand



#### HANDBALL COURT

outside the court, in the field. The server begins the play by dropping the ball to the floor anywhere within the court on that side of

the service line farthest from the board. On the first rebound, he strikes it so that it flies against the board and rebounds. A proper serve requires that, after leaving the board, the ball shall first touch the floor within the section farthest from the board. If a served ball leaving the board first touches the floor on the side of the service line nearest the board, it is called *short*; if it falls on that side of the front line farthest from the board, it is called *long*. If one long and one short or two long or two short balls are served consecutively by the same server, the server is out; in doubles, the side is out. Also, if a served ball touches the floor outside the side lines of the court, the server or side is out.

*The Return:* If the ball has been properly served, the opponent *returns* it by striking it against the board. He may make this play either from a "fly" ball or after the first bounce. If he succeeds, the server also returns it, and alternately the two players, or sides, return the ball until one misses. If the returner fails, the server scores one point, the inning is closed, and the same server opens the next inning.

Twenty-one points usually constitute a game. *Scoring shois* can be made only by the serving side; *putouts* are made by the opposition. A ball striking a player on its way from the board counts against the side struck, and scores a point or a putout for the opposition. If, on its course toward the board, it strikes an opposition player before touching the floor, it is called a *hinder*, and two hindres on one service constitute a point or a putout against the playing side. A returned ball landing outside the court means a point or a putout against the playing side. Under certain restrictions, a player may *block* his opponent by changing position, so as to prevent free access to the ball. For complete directions and official rules, consult pamphlets on handball which are obtainable from any athletic store.

**HANDEK FALLS.** See SWITZERLAND (Waters).

**HANDEL, GEORGE FREDERICK** (1685-1759), a German composer who is best known as the creator of the immortal oratorio *The Messiah*. Handel was born at Halle, in Saxony, Germany. His father was determined that the son should study law, but the boy was equally determined to devote himself to music. Through the help of a friend, George secretly had a clavichord placed in his attic bedroom, and there, at night, he made himself proficient by hours of practice. On one occasion, his father, hearing the sounds, rushed to the attic and found his son playing in his night clothes. Convinced that his boy was too much absorbed in music to be a good lawyer, the father yielded.

At the age of twelve, Handel made his débüt as a performer at the court of Berlin. Later

he played in orchestras at Hanover and Hamburg, and his first two operas, *Almira* and *Nero*, were performed in the latter city. In 1706

he left for Italy to study, where he remained three years. It was during this time that Handel's Italian style reached its full maturity, and that his name became widely known throughout the musical world. Then he went to England, where he remained the greater part of his life, becoming a naturalized citizen. But it was not until after his appointment as head of the Royal Academy of Music that he changed from opera to the composition of oratorios, and produced in succession *Israel in Egypt*, *L'Allegro* and *Il Penseroso*, *Saul*, *Samson*, and many other English oratorios.

Handel composed forty-two operas before writing *The Messiah*, which was brought out in 1741 for the benefit of the Foundling Hospital in Dublin. It is said that, at a later London performance, when the "Hallelujah Chorus" was reached, King George II, moved by pious emotion, rose to his feet, an action promptly followed by everyone in the house. To this day it is a generally observed custom for audiences to rise when this chorus is being sung. No choral festival is considered complete without some reminder of *The Messiah*. It continues as the most popular of all oratorios in America and England, combining the elements of beauty and majesty. Handel worked almost to the day of his death, for not even his blindness, during his last six years, could daunt his energy. He was buried in Westminster Abbey.

**HANDICAP**, *han' dih kap*, an extra burden or penalty placed on a competitor in athletic events, who by past performances has proved himself superior to those with whom he matches his skill. The object of the handicap is to place all contestants on an equal basis. In all events of importance, an official handicapper is appointed, whose decision as to what form the handicap shall take is final. Each event must be judged individually and suitable handicaps determined.

**How Some Handicaps Are Determined.** Horses are handicapped in races by being made to carry extra weight. In foot races, the best athletes start from a line known as "scratch." In front of them, at intervals varying according



Photo: Brown Bros

GEORGE F. HANDEL

His oratorios have made his fame imperishable.

From the painting by Margaret Dicksee

Handel Playing. The artist pictures the incident which convinced the father that the boy was destined for a career in music rather than the law.

to "form" previously shown, are placed those other runners who receive the benefit of handicaps. Contestants in swimming, field events, and other point-to-point contests are likewise handicapped by being given disadvantageous starts or positions. In cricket the handicap is sometimes set by allowing the inferior team a greater number of players. In golf a certain number of strokes is allowed a weaker opponent by a scientific determination of comparative skill.

**Derivation.** Apparently the word *handicap* has come from the expression *hand in cap*, suggesting the old manner of drawing lots.

**HAND ORGAN**, a musical instrument having four or more strings and shaped somewhat like a lute. The vibration of the strings is produced by a wooden wheel which is treated with rosin and is turned by a handle at the end. The name is also applied to the *hurdy-gurdy*, which is a primitive instrument having a harsh tone, with an exceedingly limited artistic field. The mechanism consists of a cylinder whose surface contains pegs which open valves to the pipes of the instrument. The hand organ is known to have existed in the ninth century, and was in vogue for a time in the tenth century; but the present *hurdy-gurdy* is now confined to street musicians, who frequently mount it on wheels, for greater ease in transportation. It is not a popular instrument, and is called in derision *barrel organ*, because of its cylinder.

**HANDWRITING, MEASUREMENT OF.** See **EDUCATION** (*Measuring Results of Education*).

**HANGBIRD.** See **BALTIMORE ORIOLE**.

**HANGCHOW**, *hahng' chow*, known also as **HANG-CHOW-FU**, is an ancient walled city of China, capital of the province of Chekiang, and connected with Peking by the Grand Canal, of which it is the southern terminus. It is 100 miles southwest of Shanghai, on a gulf of the East China Sea. Hangchow has been a center of Chinese learning for centuries, and it is now one of the most important commercial cities of the East. Walls twenty to thirty feet thick and forty feet high surround the ancient portion of the city, and are pierced by ten well-guarded gateways. The modern portion consists of beautiful suburbs outside the walls. Hangchow was opened to foreign trade in 1896, having previously held little or no communication with "foreign devils," as Europeans are there called. The exports consist of tea, silk, paper fans, gold and silver ornaments, tapestries, and furs; the imports are chiefly manufactured goods, copper, leather, and tobacco. Population, about 350,000.

**HANGING**, the method most widely adopted for the infliction of the death penalty upon those convicted of first-degree murder. The

present system of hanging, by use of the drop, was first used in 1760. Formerly, it was considered necessary to have trials and executions public, in order to impress evildoers; but the tendency, except in some countries in Central Europe, is now to avoid publicity, and sentence is carried out within prison walls, with only such eyewitnesses as are required by law. The time and place are fixed within limits by the sentence of the court, which orders that, between specified hours on a certain day, the condemned shall "be hanged by the neck until dead." In some jurisdictions electrocution has been substituted for hanging. Courts have very generally adopted Friday as the day of the week for executions.

**Related Subjects.** The reader is referred in these volumes to the following articles:

|                    |        |
|--------------------|--------|
| Capital Punishment | Friday |
| Electrocution      | Murder |

**HANGING GARDENS OF BABYLON**, **THE**. See **BABYLON**; **SEVEN WONDERS OF THE ANCIENT WORLD**. For illustration, see **NEBUCHADNEZZAR**.

**HANKOW**, *hahn' kow* (also spelled HAN-KAU), a growing commercial city in the interior of China, 600 miles from the sea. It is situated at the mouth of the Han River, where it enters the Yangtze, and is connected by rail with Peking. Hankow is one of China's treaty ports; it was opened to foreign trade in 1862 by the British, who had previously held exclusive commercial concessions. The native quarters of the city are dirty and overcrowded, but the European "concessions," as they are called, extending for more than three miles along the river banks, have substantial residences and business buildings. The largest ocean-going steamers ascend the Yangtze and unload into lighters moored in the river, which is here nearly a mile wide. The principal exports are tea, hides, cotton, silk, rice, and oils. The imports are piece goods, metals, and machinery. Population, 350,000.

**HANKS, NANCY.** See **LINCOLN, ABRAHAM** (*His Ancestry*).

**HAN'NA**, MARCUS ALONZO (1837-1904), an American capitalist, political leader, and former Senator of the United States. From the beginning of his career as a business man, and throughout his political activity, Hanna showed remarkable initiative and energy. He was born in Ohio and educated in the Cleveland public schools. In 1858 he entered the wholesale grocery business in Cleveland, gradually extended his interests, and in 1885 was head of a large coal and mining firm. Later, he acquired stock in newspapers, theatrical enterprises, banks, and railways.

As early as 1880, Hanna had become active in local Republican politics, and his influence steadily increased. During the period when he was the greatest single force in the Repub-

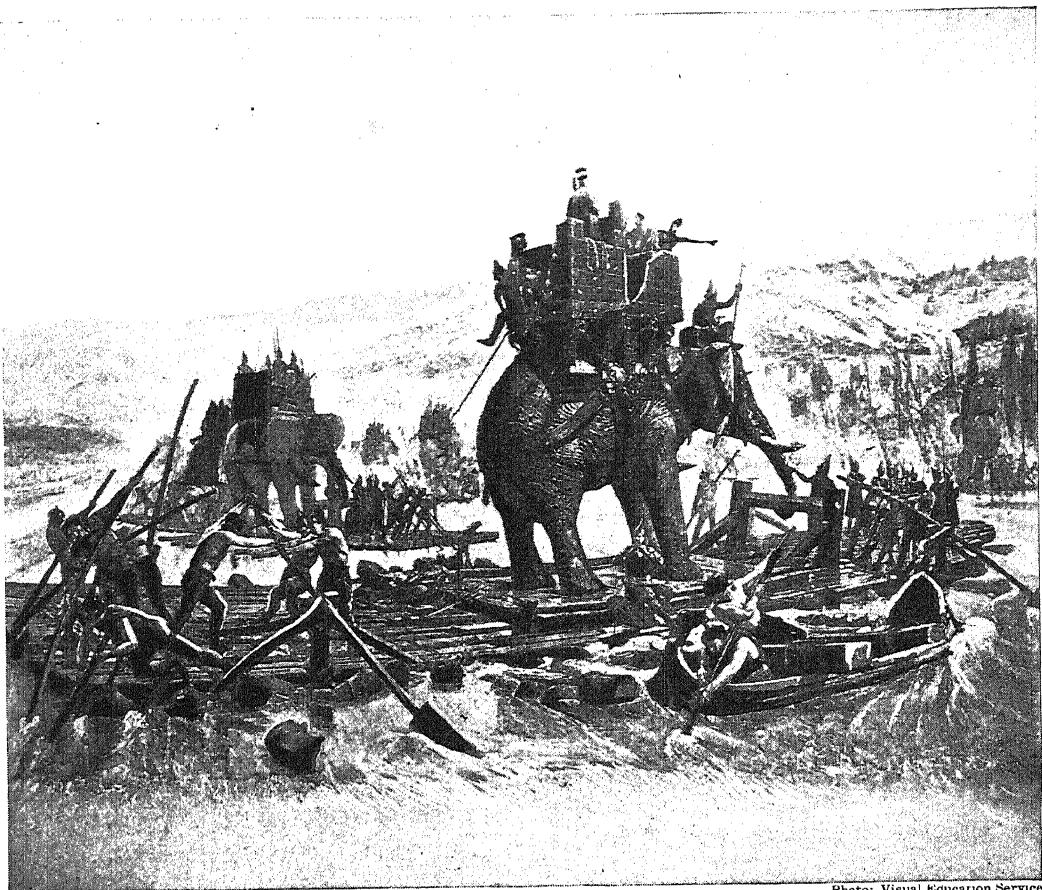


Photo: Visual Education Service

## CROSSING THE RHONE RIVER

The artist presents an imaginative picture, probably not overdrawn, which suggests the difficulties encountered by the intrepid Hannibal along his route to Italy.

lcan party, he was one of the most cordially disliked men in the nation. After the election of McKinley, he was appointed United States Senator from Ohio to fill the unexpired term of John Sherman, whom the President had made Secretary of State, and in 1898 he was elected for the following full term. He was actively interested in questions pertaining to capital and labor, and in 1902 used his influence to bring about a settlement of the anthracite coal strike. During the Roosevelt administration, Hanna was in favor of the Panama, as opposed to the Nicaraguan, route for the proposed canal.

As the outstanding conservative Republican leader, he was a Presidential possibility in 1904, but he died in February of that year. His daughter, Ruth Hanna McCormick (1880- ), inherited her father's interest in politics. She was for four years, Republican national committeewoman from Illinois, and in 1928 was elected to Congress as Representative-at-Large from the same state.

**HANNAH**, the mother of Samuel (which see).

**HANNIBAL** (247-183 B.C.), the greatest general and statesman of ancient Carthage, who in the use of stratagems and ambuscades, surpassed all other military leaders of antiquity. He was destined by his father, Hamilcar Barca, to succeed him in the work of vengeance against the Romans, who had constantly sought to bring North Africa under subjection. While still a boy, he was taken to Spain, where he showed marked evidence of his military aptitude. At the age of twenty-five, he became commander of the army in Spain. Judging that the Romans could be conquered only in Italy, Hannibal prepared to carry out his vengeance against Rome by marching across the Pyrenees, the Rhone, and the Alps with 90,000 foot soldiers, 12,000 horsemen, and thirty-seven elephants. He reached the Rhone before the Romans could check his advance, but only after great hardships; his passage over the mountains was one of the greatest achieve-

ments of any military force of antiquity (see BLASTING). Encountering a Roman army under Scipio, on the banks of the Ticino, he defeated it in 218 B.C.

The following year, Hannibal defeated the Roman general Flaminius, and then marched into Apulia. In 216 B.C. the Battle of Cannae was fought, which resulted in a total defeat for the Romans, about 50,000 of whom were killed. Hannibal then made his headquarters in Capua, where his troops lived so luxuriously that their discipline and health were undermined. In the next two years, Hannibal's position in Southern Italy became difficult; his army suffered reverses, and neither his own government nor Philip V of Macedon, his new ally, helped to recover his losses. In 212 he captured Tarentum, but lost his hold on Campania. In 203 he was called home to defend his country, which had been invaded by Scipio. He was defeated in Africa by the Romans in 202 B.C. at Zama, and after eighteen years of bloody conflict, the Second Punic War ended, Carthage being forced to accept the most humiliating conditions of peace. Hannibal was then forty-six years of age.

Peace being concluded, he proved himself an able statesman, and as civil magistrate devoted himself to restoring the resources of Carthage. Seven years after the victory of Zama, the jealous Romans sent ambassadors to demand his surrender. He fled to Ephesus and offered his services to Antiochus III of Syria for the war then commencing against the Romans. They were accepted, but, failing in an expedition against the Rhodians as commander of the Syrian fleet, Hannibal was obliged to flee. He went to Crete, then back to Asia, and sought refuge with the king of Bithynia. The Romans sent Flaminus to demand his surrender, but Hannibal preferred to die rather than be delivered into the hands of his enemies. At Libyssa he took poison, which he always carried with him, secreted in a ring. The probable year of his death was 183 B.C.

**Related Subjects.** The following topics in these volumes may be consulted in connection with the article on Hannibal:

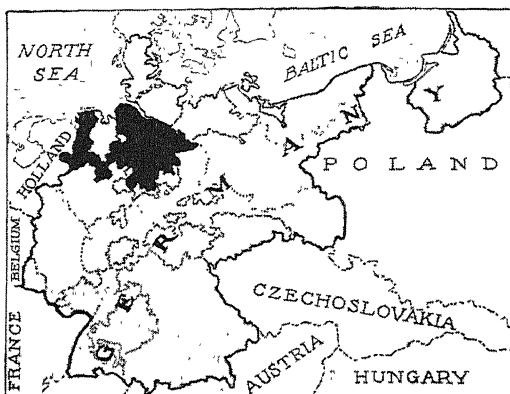
|                       |                           |
|-----------------------|---------------------------|
| Carthage              | Punic Wars                |
| Cato (Marcus Porcius) | Rome (External Expansion) |
| Hamilcar Barca        | Scipio                    |

**HANNIBAL**, Mo. See MISSOURI (back of map).

**HANOI**, *hah no' e*, or *hah' noi*. See FRENCH INDO-CHINA.

**HANOVER** (German, HANNOVER, *hah no'-fur*), since 1866 a province of Prussia bordering on the North Sea, but formerly an independent kingdom, which gave to England a line of Hanoverian rulers. Hanover is the most northwesterly province of Prussia. It is drained by the rivers Elbe, Weser, and Ems, with their numerous tributaries. The southern

part is mountainous, containing the Harz Mountains, which are extremely rich in minerals and timber. Though the soil is not very fertile, except in some low-lying districts, agriculture is the most important industry.



LOCATION MAP

The province is shown in black

and good crops of hops, flax, tobacco, and sugar beets are grown. The manufactures are extensive, especially those of iron and copper, cotton and woolen goods, and leather. Shipbuilding, also an important industry, is carried on chiefly at Wilhelmshaven, the principal base for submarine vessels during the World War. Although there are excellent railroad facilities, the River Weser is the main commercial highway of the province.

**History.** Until 1692, when it was made an electorate, Hanover was practically a part of the Duchy of Brunswick. In 1714 the Elector George Louis became King George I of England, and until 1837 Hanover was ruled by English sovereigns. The incorporation of Hanover as a part of the Prussian kingdom by the terms of the Peace of Prague, in 1866, was bitterly opposed by the king of Hanover. Enmity between the Hohenzollerns of Prussia and the Guelphs of Hanover existed until the reconciliation effected by the marriage of the daughter of Kaiser William II to Ernest Augustus, son of the last king of Hanover. See GERMANY; PRUSSIA.

**Hanover**, a flourishing manufacturing town, is capital of the province of Hanover. It has iron foundries, machine works, and manufactures of chemicals, tobacco, and cigars. As an educational center, Hanover ranks high among German cities, and is noted for the purity of the German spoken there. Its commercial growth is modern, but has been so rapid that within a few years it has become the seventh city of Prussia and eleventh in size in the German republic. Population, 1925, 422,435.

**HANOVER, HOUSE OF.** See GREAT BRITAIN (History: Accession of the House of Hanover); WINDSOR, HOUSE AND FAMILY OF.

**HANSEATIC**, *han se at' ik*, LEAGUE, OR **HANSA**, a union of a number of cities of Northern Germany, formed in about the thirteenth century for their mutual safety and the protection of their commerce. The sea and land were so overrun with pirates and robbers that Hamburg and Lübeck made a compact to keep open the road across Holstein, connecting the North and the Baltic seas. Brunswick soon joined these cities, and out of this union grew the Hansa, which at its most flourishing period included eighty-five towns and cities.

Lübeck was recognized as the leader, and here deputies of the other Hanseatic towns met to discuss their affairs. During the fifteenth century, the power of the League was at its height, but as its power and ambition increased, people dreaded its domineering authority. However, it was of great benefit to Northern Europe by establishing new centers of trade, constructing canals, and introducing a uniform system of weights and measures to facilitate commerce. After the discovery of America, the trade of Europe was entirely readjusted, so the Hansa declined rapidly and many of its members withdrew. Only Hamburg, Lübeck, and Bremen remained faithful to the old compact; under the German Empire and under the republic, they retained their self-government, being known as *Hansestädte*.

**Related Subjects.** The reader is referred in these volumes to the following articles:

|                       |                        |                   |
|-----------------------|------------------------|-------------------|
| Bremen<br>City States | Free Cities<br>Germany | Hamburg<br>Lübeck |
|-----------------------|------------------------|-------------------|

**HANSKA**, MADAME EVELINA. See BALZAC, HONORÉ DE.

**HANSON**, JOHN (1715-1783), a patriot of the Revolutionary War, and president of the Continental Congress in 1781. It was he who tendered to George Washington the thanks of Congress for the victory at Georgetown. Born near Port Tobacco, Charles County, Md., he was a member of the state house of delegates for nine terms. He was a member of the Maryland Convention of 1775, which issued a declaration known as the "Association of Free-men of Maryland," and later was one of the signers of the Articles of Confederation of the United States. In 1903 a bronze statue of Hanson, the work of Richard E. Brooks, was presented to Statuary Hall, Washington, D. C., by the state of Maryland. See STATUARY HALL.

**HANTZSCH**, BERNARD, an explorer. See BAFFIN LAND AND BAFFIN BAY.

**HAPPY HUNTING GROUND.** See INDIANS (Indian Thought).

**HAPSBURG**, *haaps' boorK*, OR **HABSBURG**, HOUSE OF, an imperial family, famous in European history, a descendant of which wore the crown of Austria-Hungary until 1918. The name, a contraction of *Habichts-*

*burg*, meaning *hawk's castle*, is taken from a castle built in the eleventh century by Werner, bishop of Strassburg. It was situated on the bank of the Aar River, in the Swiss canton of Aargau. Werner's nephew, Werner I, was the first Count of Hapsburg, but the real founder of the imperial house was Albert III. The last great ruler was Francis Joseph (which see). His nephew, Charles I, abdicated at the end of the World War in 1918; he died in exile in the Madeira Islands in 1922. Charles was the last of the Hapsburgs. See CHARLES I; AUSTRIA-HUNGARY.

**HARA-KIRI**, *hah' rah-ke' re*, a Japanese method of suicide, formerly permitted among criminals of the samurai, or military class, as being less disgraceful than public execution. It consisted of disembowelment by means of gashes made in the abdomen in the form of a cross. This manner of death was also employed by those who wished to avoid the consequences of criminal or dishonorable acts. Since 1868, when the Japanese feudal system was abolished, hara-kiri has fallen almost entirely into disuse, but it is occasionally practiced. The last prominent people to commit hara-kiri were Baron Nogi and his wife, who killed themselves in 1912, because they did not wish to live after their beloved emperor, Mutsuhito, died.

**HARALD**, a variant of Harold, name of four early kings of Norway. See HAROLD.

**HARBIN, OR KHARBIN.** See MANCHURIA (People and Cities).

**HARBOUR GRACE.** See NEWFOUNDLAND.

**HARCOURT PENTANE LAMP.** See CANDLE AND CANDLE POWER; PHOTOMETRY.

**HARD-CIDER CAMPAIGN.** See HARRISON, WILLIAM HENRY.

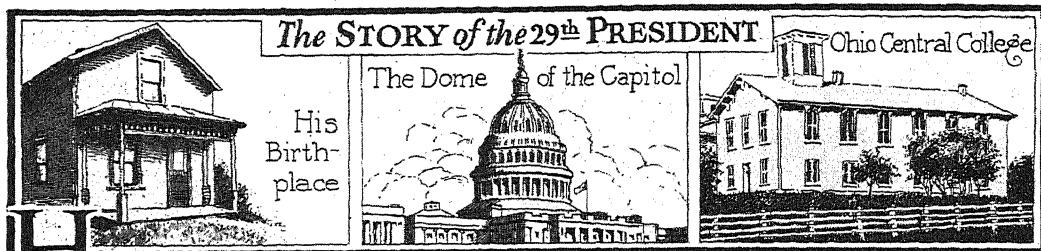
**HARDECANUTE**, *hahr de ka nute'*, OR **HARTHACNUT** (about 1019-1042), one of three successive Danish kings who ruled England and Denmark. He was the son of Canute the Great, whose courtiers, wishing to flatter him, asked that he "command the waves of the sea to stop." Hardecanute's mother was Emma of Normandy. At the time of his father's death, in 1035, he was ruling as under-king in Denmark, and his half-brother Harold at once laid claim to the throne. Hardecanute's claims were supported by his mother and Godwin, Earl of the West Saxons, who succeeded in holding Wessex, while Northumberland and Mercia were held by Harold. Hardecanute, however, made no effort to secure his part of the kingdom, and it passed also to Harold. The latter died in 1040. The Witan, or council members, then chose Hardecanute king. He reached England with sixty ships and began at once to extort a large sum for their maintenance. His reign was not marked by war or other important events, the government being left in the hands

of his mother and Earl Godwin, while he gave himself up to coarse pleasures. After his death, he was succeeded by his half-brother, later known as Edward the Confessor, who built Westminster Abbey. See ENGLAND

(England Becomes Danish); CANUTE; HAROLD (I, England).

HARDENING OF THE ARTERIES. See ARTERIES, subhead; BLOOD PRESSURE.

HARDHACK. See SPIRAEA.



# H

**H**ARDING, WARREN GAMALIEL (1865-1923), twenty-ninth President of the United States, seventh whose native state was Ohio, and the sixth to die while the incumbent of that exalted office. The close of his career came with unexpected suddenness at the conclusion of a mission to Alaska; he had deemed it an obligation to make the long journey there, to learn at first hand what were the most pressing needs of the territory. He was stricken on shipboard with ptomaine poisoning, rushed to San Francisco, and, while recovering from the original cause of his illness, died from apoplexy, on Thursday evening, August 2, 1923. Within a few hours, Calvin Coolidge, Vice-President, on vacation in Vermont, took the oath of office as President.

Mr. Harding served as Chief Executive for twenty-nine months, a period comparatively brief. During that time, the administration accomplished much that was praiseworthy, yet history must record events which later developed into a national scandal. The best opinion absolved Harding from direct responsibility and personal gain, but he was censured in the ensuing years for permitting his subordinates to follow a course that clouded his reputation.

The President disclaimed the possession of any element of genius, but showed in his public career a balance of faculties: a sense of justice; courage, on occasion, to reach decisions without regard to their effect upon his own future (as in the veto of the soldiers' bonus bill); a love of international peace, which he preached on every occasion; and withal, a kindly, gentle personality. His confidence in his subordinates and his easy-going disposition made possible the administrative ills which were disclosed within a year after his death. No matter what else may be added to a summary of the man, and notwithstanding his failure to attain true greatness, he had a spirit and bearing that endeared him to the American people to the end of his life.

A "Small-Town" Man. Warren Harding was born November 2, 1865, on a farm near Blooming Grove, O., and spent his early life in meager rural surroundings that reflected many of the characteristics of Plymouth Colony days, modified by the rugged life of the settlers who thronged from the East during the early years of the nineteenth century. His great-grandfather was Amos Harding, a descendant of the Hardings who reached Plymouth in 1624. The family moved westward by degrees, surviving the Indian massacres in the Wyoming Valley and reaching Ohio in 1820.

The youthful Warren attended high school at Caledonia, ten miles from home, and at the age of fourteen, entered Ohio Central College at Iberia, from which he was graduated in 1882 with the degree of Bachelor of Science. In Caledonia he worked on farms and in a brickyard, and assisted his father, who was a miller as well as physician to the community. For several years he was a member of the local band, and he learned to set type on the little weekly paper of the village. This latter rather ordinary accomplishment determined his business future and opened the door to political life. The Marion *Star*, a struggling weekly, swamped in debt, was purchased for the son by the father, who had observed Warren's success as editor of a small college publication.

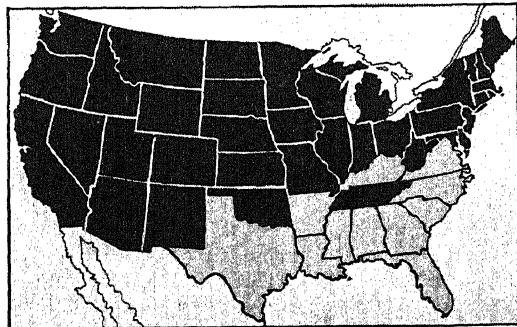
His youthful country environment and the long editorial experience which ensued created an impression so profound that, even at the summit of his career, he never lost his small-town sympathies. It was remarked by a statesman, after the death of Harding, that whatever it was in the Roman republic that taught its truest sons suavity and refinement without indebtedness to cities, a gentility in spite of ruggedness of line of descent, that thing this rural-minded President had.

**Business and Matrimony.** The Marion *Star* became at once on its acquisition a serious problem to the young printer-editor; it

was necessary speedily to lift it above a weekly deficit. But Harding did not give himself exclusively to this task; he wanted to marry Florence Kling, daughter of one of Marion's leading citizens. Her father refused his consent to the union, which promised little beyond a life of hardship for his daughter. The young people determined the matter for themselves, were wed on July 8, 1891, in spite of objections, and were not forgiven for over twenty years. Reconciliation did not take place until Harding had risen high in public life. At the burial of the President in Marion cemetery, on August 10, 1923, old-time friends gazed grimly and not kindly at the tomb of the unrelenting father who might have brightened the lives of these two of their associates. The new Mrs. Harding was as resolute as her young husband; together they toiled on their newspaper and saw it develop into a fine and valuable property. Only a month before his death, the President disposed of it, for other interests demanded his major attention.

**Stepping Stones to the Presidency.** The newspaper was a stepping-stone to a political career. In 1900 Harding was elected to the state senate, where he remained four years, only leaving that post to become lieutenant governor of the state. This office he filled from 1904 to 1906. In 1908 he was a delegate to the national Republican convention, and on that occasion became known outside of his state. In 1910 he was the unsuccessful nominee of his party for governor. Subsequently, he was a delegate to the national conventions of his party in 1912, 1916, and 1920; in 1916 he was chairman of the convention.

Harding was one of the first men in the Union to be elected United States Senator by direct vote of the people. This event, which made him a national character, occurred in



ELECTION MAP OF 1920

States shown in black gave their electoral votes to the Republican national ticket. States carried by the Democratic candidate, Cox, are shown in lighter tint.

1914; his majority over his Democratic opponent was more than 102,000.

**As President.** Harding was an avowed

candidate for the Presidential nomination at the national convention of the Republican party in Chicago in 1920, though his claims

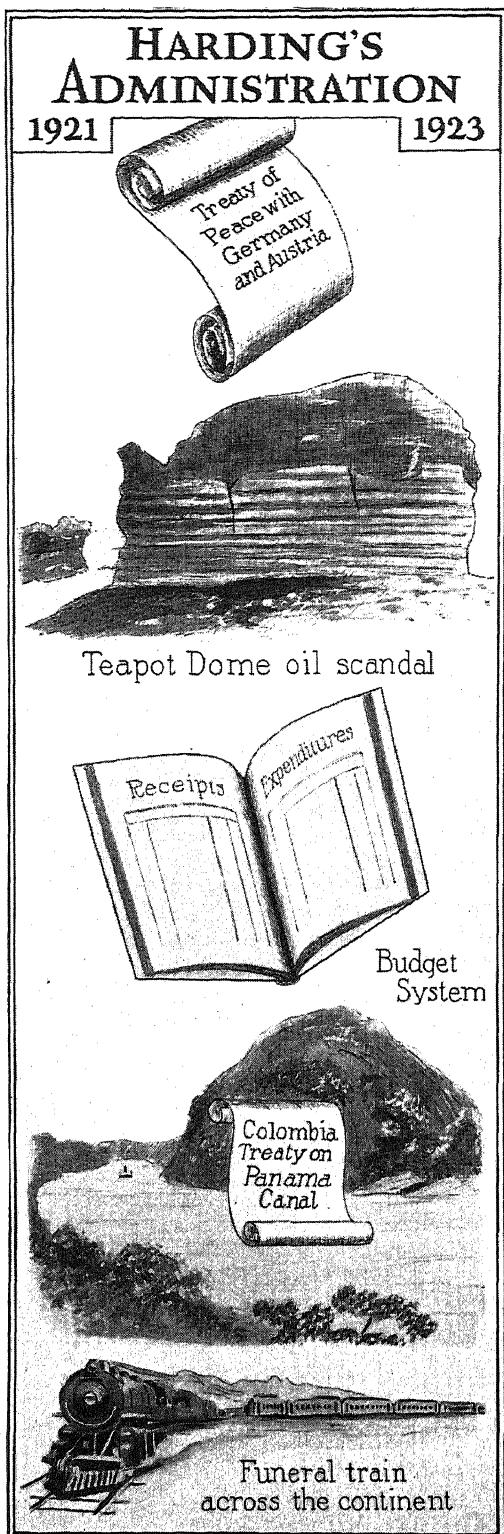


WARREN G. HARDING

Twenty-ninth President of the United States.  
Twenty-nine months in the office.

were overshadowed by the candidacies of other men, notably General Leonard Wood, Governor Coolidge of Massachusetts, former governors Lowden of Illinois and Johnson of California, and Herbert Hoover. On the tenth ballot he was nominated. In his campaign for election, he did not hesitate to place himself squarely on record as opposed to ratification of the Treaty of Versailles and in favor of a separate peace with Germany; on this paramount issue he was elected by a majority which was overwhelming, receiving 16,152,200 votes to 9,147,353 cast for his Democratic opponent, James M. Cox of Ohio.

In most of his Cabinet appointments, President Harding justified the expectations of those who knew him best; regardless of political opposition, he named strong men to the most important posts, including Charles Evans Hughes as Secretary of State, Andrew Mellon as Secretary of the Treasury, and Herbert Hoover as Secretary of Commerce. Included in the personnel of the Cabinet, however, were two men who later were discredited before the people—Harry M. Daugherty of Ohio and Albert B. Fall of New Mexico. Daugherty was named as Attorney-General on the basis of years of friendship with the new President. Fall had been a United States



Senator, with a good record which seemed to indicate proper equipment for the post of Secretary of the Interior. Later, it developed that in handling the Teapot Dome oil reserves, he was guilty of poor judgment and a lack of fine patriotic sense. Another Cabinet member who later became the subject of criticism was Edwin Denby, Secretary of the Navy.

**Important Achievements.** History may record as the outstanding feature of the Harding administration the conference on limitation of armaments, which was called by the President to meet in Washington in November, 1921. It resulted in treaties for lasting peace in the area of the Pacific Ocean, where the possibility of war had long been apparent; brought about an agreement whereby the race for naval supremacy among the nations was halted in the matter of battleships, and existing navies were greatly reduced; and secured more ample justice in China.

The President must be given credit for the establishment of the budget system in the Federal government, a measure that former Presidents had recommended, but were unable to carry through because of political opposition. Harding incurred the wrath, temporarily, of the young veterans of the World War by vetoing an act of Congress providing a bonus for all soldiers, although in principle he favored the measure; the veto was employed because the act did not provide the money that would be required to meet the payments.

Probably the leading foreign question which arose during the administration centered around Harding's proposal that the United States should become identified with the World Court at The Hague. The President believed that, without hazard to American interests, membership in the Court offered the best means by which the country could be helpful to stricken and quarreling Europe. He died before public sentiment crystallized on the subject, but he contributed much to general enlightenment on this topic. In 1926 the Senate, under the leadership of President Coolidge, Harding's successor, voted for American adherence to the Court, but with reservations which other nations refused to accept.

**Teapot Dome.** The scandal which developed from the Teapot Dome oil leases did not break until after Harding's death, but it deeply involved Cabinet members who owed their appointment to him. As a result of a prolonged investigation, bitterly pursued, Attorney-General Daugherty and Secretary of the Interior Fall resigned, and the latter was indicted, with others, on the criminal charge of having accepted money for the transfer of naval oil reserves to private interests. Though not directly involved, Secretary of the Navy Denby also was forced to resign his

## Outline and Questions on Warren Gamaliel Harding

### Outline

#### I. Early Years

- (1) Birth and ancestry
  - (a) Descendant of Plymouth family
  - (b) Father a physician
- (2) Education
  - (a) Graduate of Ohio Central College
  - (b) Farm work and newspaper editing gave rural point of view

#### II. Business Career

- (1) Ownership of Marion *Star* gave good training in business management
- (2) Newspaper work the stepping-stone to public life
- (3) One of the first United States Senators elected by popular vote.

#### III. Administration

- (1) Appointment of strong men to the cabinet
  - (a) Two appointments which proved unfortunate
- (2) Limitation of armaments conference an outstanding achievement
- (3) Establishment of Federal budget system
- (4) Advocacy of the Hague Court
- (5) Teapot Dome scandal
- (6) Achievements
  - (a) Peace with Germany and Austria
  - (b) Ratification of Colombia treaty
  - (c) Restriction of immigration
  - (d) Farm credits
  - (e) Aid for disabled veterans

### Questions

What was the purpose of President Harding's visit to Alaska?

To what extent was he to blame for the administration scandals?

What characteristics caused him to be well liked by his associates?

What qualities are implied in the statement that Harding was a "small-town" man?

Why did he veto the soldiers' bonus bill?

Why did the United States make a separate peace with Germany?

portfolio. Several trials were held; only one, Fall, was convicted (1929).

[These events occurred during the early months of the administration which succeeded Harding's; for the full story, the reader is referred to the article COOLIDGE, CALVIN.]

**Other Administration Events.** Other events of note during the twenty-nine months of Harding's term included the following: the

reëstablishment of peace with Germany and Austria; ratification of the Colombia treaty, which had been before the Senate since Roosevelt recognized the independence of Panama; restriction of immigration; legislation beneficial to farmers, with particular reference to easier credits on more liberal terms; extension of the program of aid for wounded, sick, and disabled veterans of the war.

**Harding's Funeral.** The President died in a San Francisco hotel, on his way home from Alaska. His body was placed on a special funeral train and carried to the capital city, Washington, amid scenes unparalleled in American history. The nation was more profoundly stirred when Lincoln was killed, and the train which bore the martyred President from Washington to Springfield was viewed by throngs of mourners along its route, yet circumstances gave to the funeral train of Harding a more spectacular setting. The route covered approximately 3,000 miles; the country's population since Lincoln's death had trebled, and the Great West had received a large part of the increase. Therefore, it is no exaggeration to record that, through nearly every state across which the Harding train passed, it was flanked on each side by almost a solid wall of mourning citizens, who stood for hours to pay a silent tribute to the nation's dead leader.

The funeral train later went from Washington to the Harding home at Marion, where the funeral was held. Interment was in the local cemetery, in a temporary tomb. A permanent memorial tomb was later erected, and in it the former President and his wife are buried.

E.D.F.

Florence Kling Harding (1860-1924), whose difficult years in the White House were ended by tragedy, was the daughter of Amos Kling, a banker of Marion. She was the divorced wife of Henry de Wolfe, and had one son, Marshall Eugene de Wolfe.

When she married Warren Harding, in 1901, he was a young newspaper publisher in Marion; she shared the struggles of his early career and had much to do with his later successes. In spite of the brilliant social affairs of the Harding régime, it is evident that Mrs. Harding was not altogether happy in the White House. Ill health and her temperament both added to the difficulty she felt in becoming accustomed to the social duties of her high position.



Photo: U & U

FLORENCE KLING HARDING

She died in 1924, and was buried at Marion. The Hardings had no children, and most of her estate, estimated at more than \$500,000, was left in trust for Jeanne and George N. de Wolfe.

**Related Subjects.** The reader who desires additional information regarding the life and times of this President is referred in these volumes to the following articles:

|  |                                    |
|--|------------------------------------|
| Armaments, Limitation of                 | Soldiers' Bonus                    |
| Coolidge, Calvin                         | Vancouver (International Memorial) |
| Permanent Court of International Justice | Versailles, Treaty of              |

**HARDNESS.** In a solid substance, such as copper, glass, or steel, hardness is determined by its ability to scratch or to resist being scratched by other substances. The hardness of any given substance is generally measured from a table of a few well-known minerals, ranging from the soft talc, which is easily scratched by the finger nail, to the diamond, the hardest known substance. This standard "scale of hardness," beginning with the soft minerals, is as follows:

|               |             |
|---------------|-------------|
| 1. Talc       | 6. Feldspar |
| 2. Gypsum     | 7. Quartz   |
| 3. Calcite    | 8. Topaz    |
| 4. Fluor Spar | 9. Sapphire |
| 5. Apatite    | 10. Diamond |

For accurately testing hardness, particularly in manufacturing tools, gears, etc., machinists use an instrument called a *sclerometer*, which registers the force required to dent or to scratch the body with a diamond. A.L.F.

**HARDY, THOMAS** (1840-1928). This writer, the "last of the Victorians," was one of England's greatest novelists, and was scarcely less distinguished as a poet. He was born in Dorsetshire, the "Wessex" of much of his writing, and was educated privately and at King's College, London. At the age of sixteen, Hardy was articled to an ecclesiastical architect in Dorchester. He began writing essays at the age of twenty-three, but continued his work as architect for about five years longer. His first successful novel,

*Under the Greenwood Tree*, was published in 1872. Thereafter, for thirty years, he devoted himself to fiction, finding inspiration in the beloved countryside about his estate at the little town of Stinsford, near Dorchester. In his later years, he gave himself chiefly to poetry. Hardy was buried in Westminster Abbey, but his heart was placed in a grave in the village which was his home for so many years.



THOMAS HARDY

**Summary of His Literary Career.** *Under the Greenwood Tree* was followed by *A Pair of Blue Eyes*, and this by *Far from the Madding Crowd*, always one of his most popular novels. In *The Return of the Native*, Hardy wrote what many consider his finest achievement. *The Woodlanders*, *Tess of the D'Urbervilles* (his best-known story), *Jude the Obscure*, and a volume of short stories, *Life's Little Ironies*, are other fine examples of his art. The story of Tess is so tragic and so vividly written that it makes a profound impression on each generation of readers. Mrs. Fiske's interpretation of the character of Tess was one of her finest stage presentations. Hardy regards men as helpless victims of a power, or destiny, over which they have no control, and he also conceives of Nature as entering into the lives and fortunes of his characters. His portrayals of the stern, primitive types of peasant folk are pictures that will endure in literature.

As a poet, Hardy is best known for his great epic-drama, *The Dynasts* (1904-1908). This is divided into three separate poems, and has to do with the rise and fall of Napoleon. In 1920 it was produced on the London stage. After the completion of this poem, Hardy turned to lyric poetry as a medium for expressing the religion and philosophy that were so essentially a part of his work. Between 1909 and 1925 he wrote a series of lyrical poems of remarkable originality and depth of feeling. These include *Time's Laughing-stocks*, *Satires of Circumstance*, *Moments of Vision*, and *Human Shows*, *Far Fantasies*.

**HARE.** In the old fable of the hare and the tortoise, the hare lost the race because he thought it unnecessary to do his best. In real life, a hare is sure to win a race, for this is one of the fleetest of small animals, and its great speed serves as its chief means of escape from danger, and for defense against its enemies.

**Hares and Rabbits.** Hares are found in nearly all parts of the world, but in America they have been commonly, though mistakenly, called rabbits (see RABBITS). The long-eared, long-legged *jack rabbit* of Western plains and prairies, and the common little *cottontail*, found throughout America, are really hares. Rabbits were originally European animals, but they have been introduced into other countries. They are smaller than hares, with shorter limbs and ears. They are not as quick as their larger relatives, for, to escape their enemies, they need only enter their burrows. Hares do not burrow. The young of rabbits, unlike those of hares, are born blind and almost hairless. The *Belgian hare* is really a large rabbit.

**Description.** Hares range from seventeen to twenty-five inches in length. They have soft fur, usually gray or brown, although that of some species turns white in winter. Their tails are short, bushy, and upturned. When hares literally fly across the ground in great leaps and bounds, for which the long hind legs are especially fitted, it is plainly seen that the under tail is white. Black markings show on the lifted ears. When the animal squats on the ground, it is so like its surroundings that were it not for

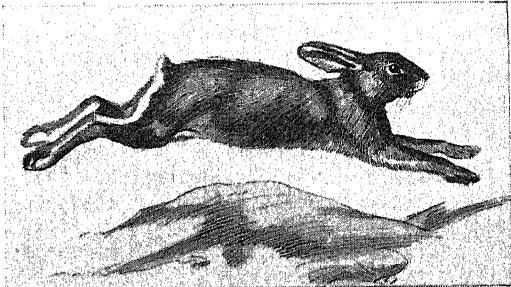
its breathing, and for its quivering whiskers, it would oftentimes not be discovered, so well does it become a part of nature's color scheme.

The upper lip of the hare is split, and the noses and lips of the young, especially, seem always aquiver. Their forefeet have five toes, and the hind feet have four. Those hind feet are capable of striking quite hard blows if the animal is driven to bay. The soles of the feet are hairy. The forefeet of the animal cannot be used for carrying food to the mouth, as can those of the squirrel.

**Habits.** Hares feed on vegetable matter alone, and they are especially fond of cabbage, grain, and the bark of trees. They feed and roam about mostly at night, returning at break of day to their hollows, or *forms*, in the grass or near a sheltered rock. During nightly foraging expeditions, much havoc is often wrought in grain fields, vegetable gardens, and plantations.

Hares multiply rapidly, mating when six months old and producing two and three broods yearly, with from two to five young in each brood. At the end of a month or two, young hares leave their parents and shift for themselves. So in sections where civilization has killed off the natural enemies of these rapidly multiplying creatures, such as the coyotes, foxes, weasels, eagles, hawks, etc., men must devise means to save their crops from the hare family. In many places, rabbit-proof fences have been erected, but the animals, where they have become a serious menace to agriculture, are much hunted, especially in Australia, not only with snares, dogs, and guns, but by periodical drives. All the men and boys, and sometimes women and girls, of a district circle about a space of a square mile or so, and drive the hares from their hiding places into an enclosure. There they are beaten to death with clubs, often as many as 20,000 having been disposed of in this way in a day.

The month of March is the principal breeding time of hares, and the crazy antics through which they go at that time suggested the much-



A GRACEFUL RUNNER

used phrase, *as mad as a March hare*. Lewis Carroll's humorous characterization of a March hare is familiar to readers of *Alice's Adventures in Wonderland*.

Although the flesh of hares is rather dry, it is prized for its peculiar flavor. The fur of these animals, especially of those which turn white

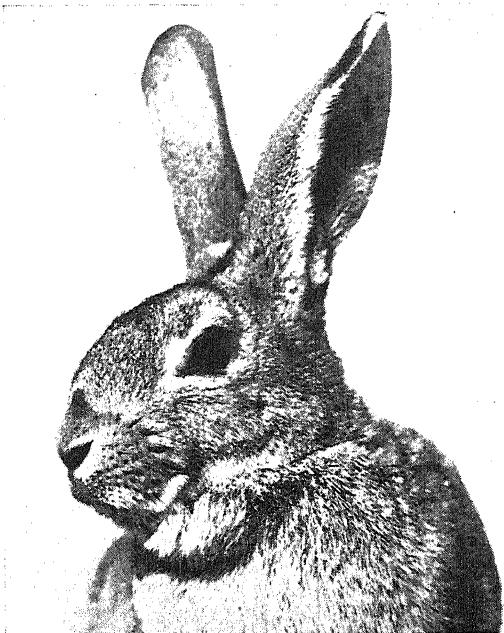


Photo: P & A

EARS UP, TO CATCH EVERY SOUND

in winter, is used to imitate more expensive furs (see FUR AND FUR TRADE).

W.N.H.

**Scientific Names.** Hares and rabbits form the family *Leporidae* in the order *Rodenia*. Hares belong to the genus *Lepus*.

**HAREBELL.** See BLUEBELL.

**HAREFOOT**, surname of Harold I. See HAROLD (I, England).

**HARELIP**, sometimes known as CLEFT LIP, takes its name from its resemblance to the lip of a hare. It is a cleft in the upper human lip, and exists from birth. A double cleft sometimes appears, one on each side of the middle of the lip; when single, the cleft is on one side of the middle. A similar defect, *cleft palate*, usually exists when the lip has a double cleft.

**HAREM**, *ha' rem*, the name given in Mohammedan countries to the part of the dwelling reserved for female members of the household, and from which all men, excepting the husband and intimate male relations, are excluded. The term also signifies the inmates themselves.

As an institution, the harem is of remote origin. It existed among the ancient Babylonians and Persians, and among all those races which, while sanctioning polygamy, or plurality of wives, have attained some degree of civilization. It reached its greatest development, however, among the Mohammedans.

The most famous harem was that of the former sultan of Turkey, at Constantinople; its inmates were allowed greater liberties than those of similar institutions. The Koran allows four wives to a Mussulman, and an indefinite number of concubines, or female slaves, but owing to the expense of maintaining more than one establishment, the majority of Turkish and Persian men have only one wife; indeed, in the new National State of Turkey, it was decreed that no man ought to have more than one wife.

Within the harem the woman rules supreme; there, surrounded by attendants, she receives her female friends and indulges in the various occupations and amusements at her command, such as spinning, sewing, self-ornamentation, and witnessing the dances of the slaves.

While royal harems may be regarded as permanent institutions, individual maintenance of such establishments in Oriental countries is losing ground, principally because women are demanding and achieving a much greater degree of freedom. See ZENANA.

**Derivation.** The word *harem* is derived from an Arabic word meaning *that which is sacred, set apart, forbidden*.

**HARGREAVES, hahr' greevz, JAMES** (about 1720-1778), the inventor of the carding machine and the spinning jenny, which, with the power loom invented by Cartwright, revolutionized the cotton industry and placed it on a new basis. He was a poorly educated Englishman, who earned his living by weaving and spinning in his home at Stanhill. After producing the spinning jenny in 1764, he sold a few of the machines, which performed eight times the work of a hand spinner. Some of his fellow workers became jealous of the amount of work he could do, so they broke into his house and destroyed the machine. Hargreaves moved to Nottingham in 1768, and erected a spinning mill, but manufacturers stole his design. As it was proved that he had sold some of the machines, the government refused to give him a patent, so he never profited by his invention. See CARTWRIGHT, EDMUND; SPINNING JENNY.

**HARK, HARK, THE DOGS DO BARK.** See RHYMES OF CHILDHOOD.

**HARKNESS, MRS. STEPHEN V.** See EDUCATIONAL FOUNDATIONS (The Commonwealth Fund).

**HARLAN, JOHN MAYNARD** (1833-1911), a former Associate Justice of the United States Supreme Court, who rendered distinguished service in that position for over a third of a century. He was born in Boyle County, Ky., was graduated from Center College in 1850, and studied law at Transylvania University. After his admission to the bar, he practiced law in Frankfort, Ky., and was elected county judge

in 1858. On the outbreak of the War of Secession, he organized for the Federal cause the Tenth Kentucky Infantry, was made its colonel, and served under General Thomas until 1863, when he resigned. He was attorney-general of Kentucky from that year to 1867. On November 29, 1877, he was appointed to the Supreme Court by President Hayes and served for thirty-four years, Chief Justice John Marshall alone exceeding this length of service, and only by a few months. Justice Harlan was considered one of the ablest members of the Supreme Court. See SUPREME COURT OF THE UNITED STATES.

**HARLAN, JAMES** (1820-1899), United States Senator from Iowa, and Secretary of the Interior in the Cabinet of President Andrew Johnson. Harlan was born in Clark County, Ill., but his family moved to Indiana when he was four years of age. In 1845 he removed to Iowa City, Ia., where, two years later, he became superintendent of public instruction. He was admitted to the bar in 1848, and was president of the Iowa Wesleyan University from 1853 to 1855. Harlan served as Senator from 1857 to 1865, when he resigned to accept the Cabinet portfolio offered him by President Johnson. He was reelected United States Senator from 1867 to 1873. Iowa's first contribution to Statuary Hall, Washington D. C., was a bronze statue of James Harlan, by Nellie V. Walker. See STATUARY HALL.

**HARLEM RIVER.** See NEW YORK, N. Y.

**HARLEQUIN, hahr' le kwin,** a pantomime performer who figured in Italian comedies. His rôle, like that of the modern clown, was characterized by great bodily agility and buffoonery of an extravagant nature. See PANTOMIME.

**HARMATTAN, hahr mat' an**, a west-coast African wind which blows from the interior during December, January, and February. Clouds of reddish dust, called "smokes," generally precede the wind. The wind is devastatingly hot, and the dust settles over vegetation and the human body, causing the skin to peel off and drying up the mucous membranes of the eyes, nose, and mouth.

**HARMONICA, hahr mon' ih kah.** This term is applied to two simple musical instruments. Benjamin Franklin invented a so-called harmonica, consisting of a series of cup-shaped glasses which were made to revolve while

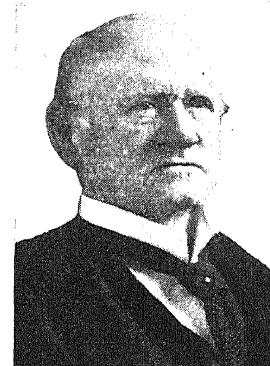


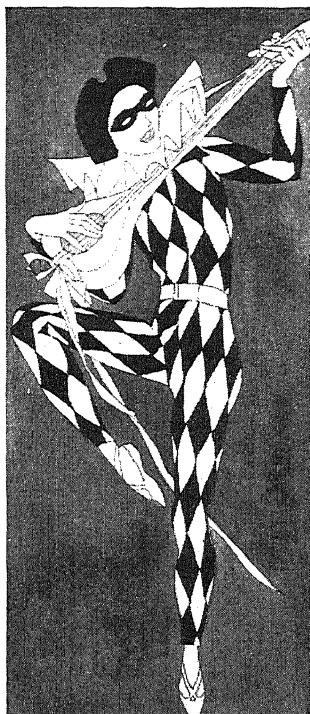
Photo: Brown Bros.

JOHN M. HARLAN

their moistened rims were touched by the finger. The compass of its notes was from *C* to *F*. The idea is said to have originated with an Irishman named Pockrich, who gave public performances in London on a similar device. Franklin's harmonica had a considerable vogue in Europe for a time. Many attempts to substitute keys for the finger were unsuccessful, as the human touch imparted a tone to the sound which no inanimate substance could supply. The other instrument called harmonica is more commonly known as the *mouth organ*. It is a small wind instrument whose notes are produced by reeds set in vibration by air which the player breathes in and out. See *ORGAN*.

**HARMONICS**, *haar mon' iks*, the accessory tones which accompany any string, pipe, or other clear-sounding body. Every musical sound consists of a principal or fundamental tone accompanied by higher tones, or harmonics, which blend and generally harmonize with it. As a test, strike a low note on a piano, holding down the loud pedal. As the sound dies away, the harmonics (or partial tones) can be heard distinctly. When a sound is produced by the vibration of a string, the string vibrates as a whole, giving rise to a tone called the *fundamental*. This string, however, divides into various sections which vibrate separately and produce sounds differing from the fundamental, but blending with it; these sounds are its *harmonics*.

The first harmonic of the fundamental note of any string is that produced by half the string, and is the *octave* of the fundamental tone; the second harmonic is produced by each third of the string, and is the fifth, or *dominant*, of the fundamental note, and so on, the complete series of harmonics containing all the notes of the musical scale. The peculiar recognizable character of all sounds—



HARLEQUIN

whether voice, piano, organ, violin, or any other musical instrument—is due to the presence of harmonics, each with its own degree of loudness, thus producing different qualities of tone. See *MUSIC*; *SOUND*; *HARMONY*.

**HARMONY**, that branch of musical science which deals with chords, their constitution, and their relation and progression. It is the result of the development of instrumental music, just as counterpoint, the science which preceded harmony, grew with the development of song. It is a fundamental branch of musical theory and composition, the importance of which can readily be realized from the fact that any simple melody can be made to arouse widely variant emotions when given different harmonic settings. Claude Monteverde, during the seventeenth century, introduced combinations of sound forbidden in counterpoint, and laid the foundation of modern harmony. The science made great progress under Bach, Wagner, Mozart, and Beethoven. In fact, innumerable examples of the principles underlying harmony are found in the works of all great composers, for in many instances, the beauty and power of their compositions depend largely upon the harmonies which they are able to form about a single simple theme. See *MUSIC* (*A Course of Lessons: A Lesson on Harmony*).

**HARMSWORTH, ALFRED CHARLES WILLLIAM.** See *NORTHCLIFFE, LORD*.

**HARNESS**, the tackle worn by a horse, mule, donkey, or other draft animal when attached to a vehicle. The harness is made of leather, and has metallic buckles and clasps to keep it in place. The important parts are described below the illustration, page 3048.

**HARNESS RACE.** See *RACE* (*Speed Records by Horses*).

**HARNEY PEAK.** See *SOUTH DAKOTA* (*The Land*); *BLACK HILLS*.

**HAROLD**, *hair' uld*, the name borne by two kings who ruled England before it became a united nation through the conquest of William of Normandy.

**Harold I**, surnamed *Harefoot*, was the son of Canute, king of England, Denmark, and Norway. On the death of Canute, in 1035, Harold claimed the throne in opposition to his brother, Hardecanute, who was then in Denmark. In order to avoid civil war, an agreement was made that Harold should become king of the provinces north of the Thames. In 1037, however, he was crowned king of all England, as the people were tired of waiting for Hardecanute to return. Harold died in 1040, when his brother was making preparation to invade England.

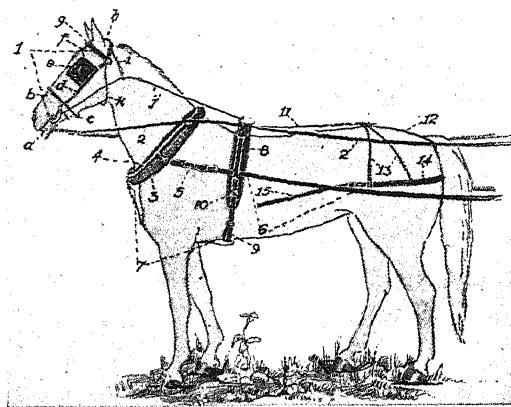
**Harold II** (1022-1066), successor of Edward the Confessor, was the last Anglo-Saxon king of England. He was the son of the powerful Earl Godwin, whose death in 1053 left him Earl of Wessex and head of the National party, which was striving to weaken the influence of the Normans at the court of Edward the Confessor.

In 1064 he visited Normandy. The story has come down that he was shipwrecked on the coast of Normandy, and, falling into the power of Duke William, was forced to take an oath that he would aid the latter to become king of England. Two years later Edward the Confessor died, and the assembly of nobles (Witenagemot) elected Harold king. William of Normandy at once laid claim to the throne, and in September, 1066, invaded England at the head of a large army. At Senlac, near Hastings, Harold met defeat and death, and England passed to Norman rule.

**Related Subjects.** Other historical material connected with these men will be found in the following articles:

Hardecanute  
Hastings, Battle of

William (I, the Conqueror)  
Witenagemot



PARTS OF THE HARNESS (See page 3047)

1. Bridle; used to hold the bit in the mouth and to restrain the horse. The parts are bit (*a*), nose band (*b*), chin band (*c*), face band (*d*), blinds (*e*), winker braces (*f*), brow band (*g*), crown band (*h*), gag swivel (*i*), side check (*j*), throat latch (*k*).
2. Lines; used to control and restrain the horse.
3. Collar; used to protect the shoulder, thus enabling the horse to draw heavy loads without injuring the shoulder.
4. Hames; used to distribute weight along the collar.
5. Hame tugs; used to fasten the traces to the hames.
6. Traces; used to connect the hame tugs to the load.
7. Martingale; often used to hold the collar in place in backing a load, and sometimes attached to the lines to hold the horse's head in position.
8. Saddle; used to protect the back from the weight of the shafts, to receive the check rein, to hold the lines and the parts of the harness in place.
9. Girth; used to hold the harness in place.
10. Shaft tug; used to hold the shafts in place.
11. Back strap; used to hold the saddle, hip straps and crupper in place.
12. Crupper; used to hold the hip straps, and in connection with the back band to hold the saddle in place.
13. Hip straps; used to hold the breeching in place.
14. Breeching; used in connection with backing the load.
15. Holdback straps; used to connect the breeching with the load in order to hold back and in backing.

**HAROLD, OR HARALD**, the name of four of the early kings of Norway.

**Harold I** (about 850-933) became sole king of the Norwegian realm in 872, after many years of warfare against the numerous petty kings, or jarls, who then

ruled in Norway. According to legend, he was inspired in his labor of conquest by his love for a beautiful maiden who refused to become his wife until he had subjugated the entire country. After establishing his authority, Harold drove out the conquered rulers, who made numerous settlements on the neighboring islands. During his reign, he was engaged in suppressing the sea pirates and brigands who had long harassed the country.

**Harold III** (1015-1066), a descendant of Harold I, ruled as king of Norway from 1046 to 1066. Early Norwegian literature abounds with stories of his exploits as captain of the bodyguard of the Greek emperors at Constantinople. He was ruled by his adventurous spirit, even after he had become king of Norway, and on concluding a war with the Danes, invaded England in 1066, to aid Tostig against the latter's brother Harold, king of England. At the Battle of Stamford Bridge, both Harold of Norway and Tostig were slain. See **HAROLD (II, England)**.

**HAROUN-AL-RASHID**, *hah roon'-ahl-rah-sheed'*. See **HARUN-AL-RASHID**.

**HARP**, the most ancient of stringed musical instruments, and the most important of those in which the strings are plucked, rather than sounded with a bow.

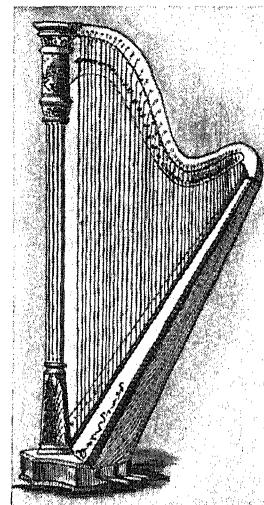
The harp, according to the Bible, was invented by Jubal. From remote times the favorite instrument of the Irish bards, it has become, like the shamrock, an emblem of Ireland; to the poets of Erin, the silencing of the harp is the symbol of the decline of national glory. So runs the theme of one of Thomas Moore's finest lyrics:

The harp that once through Tara's halls  
The soul of music shed,  
Now hangs as mute on

Tara's walls  
As if that soul were fled.

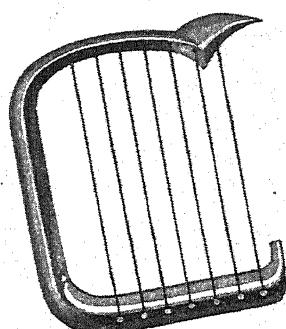
So sleeps the pride of former days,  
So glory's thrill is o'er;  
And hearts that once beat high for praise  
Now feel that pulse no more.

The harp was used for accompaniment to the psalms sung by the early Christians, and is intimately associated with David, the poet-psalmist of the Bible. The double harp, or David's harp, as it is also called, is played with the fingers and thumbs of both hands. It is a triangular-shaped instrument, with a sounding board and catgut strings. It is always tuned



MODERN HARP

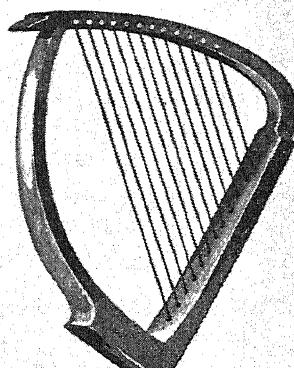
The standard size has the column 64 inches high; the extreme width is 33 inches. It has 43 strings, the longest of which is 57 inches. The weight averages 53 pounds. Some harps are beautified by gold plating.



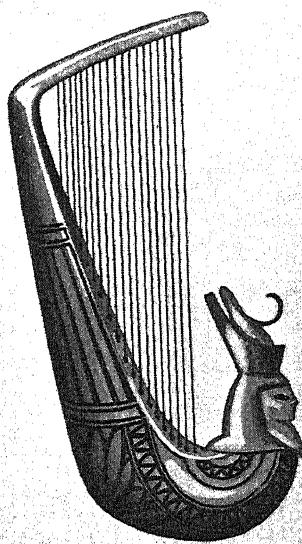
Finnish



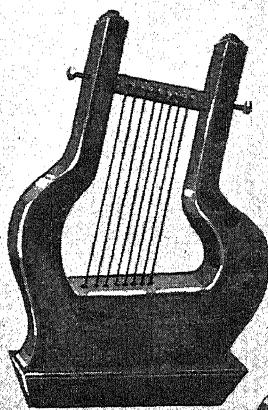
Irish



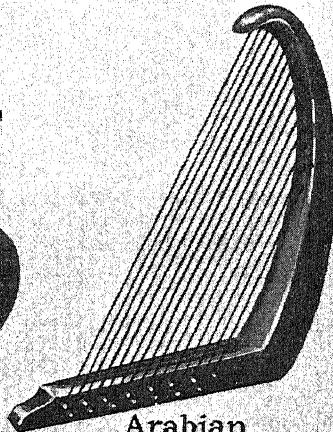
Saxon



Egyptian



Grecian



Arabian

## HARPS OF OLDEN DAYS

in the principal key of the music, while by pressing with the thumb or turning the tuning-pins of certain notes, the strings are changed to suit any modulations out of the key.

The pedal harp, a perfected form of the double instrument, developed about 1720 with the invention of Hochbrücker's mechanism. This included seven pedals, by means of which each note of the scale, in all the different octaves, can be made a semitone higher. By Erard's invention of the double-action pedal harp in 1820, the instrument reached its highest development. This improvement permitted two changes in the length of the strings, with corresponding changes in the tone. The insistent and mellowed sweetness of the harmony and the artistic appearance of the instrument render it an effective medium for orchestral and recital music. As many as eight harps figure in the final scene of Wagner's opera *Das Rheingold*.

**HARPER, WILLIAM RAINESY** (1856-1906), an American educator, first president of the University of Chicago and the real inspiration of much of its greatness. He was born at New Concord, O., studied at Muskingum College and at Yale, and in 1879 became professor of Hebrew at the Union Theological Seminary (Baptist) in Chicago. There he established an unusual reputation as a Hebrew scholar, and in 1886 was made professor of Semitic languages at Yale. In 1891, when the new University of Chicago was founded, he was called to be its head, and proved himself no less noteworthy as an administrator than as a scholar. After a notable career of nearly fifteen years at the university, he died. Dr. Harper's heroic struggle with disease, and his determination to keep on with his work in the face of suffering and of death, won for him wide respect and admiration.

**As Writer and Editor.** His publications almost all deal with some phase of Hebrew language or literature, and include *Elements of Hebrew*, *Elements of Hebrew Syntax*, and *Amos and Hosea*. He also wrote *The Trend of Higher Education*, and edited the *Biblical World*, the *American Journal of Theology*, and the *American Journal of Semitic Language and Literature*.

[For illustration of Harper Memorial Library, See CHICAGO, UNIVERSITY OF.]

**HARPER'S FERRY**, an historic village of West Virginia, made famous by John Brown's raid in 1859,

one of the critical events preceding the War of Secession. Located on the Potomac, fifty-five miles northwest of Washington, where the river breaks through the Blue Ridge Mountains and meets the Shenandoah, the town is very picturesque and was considered a strategical point by the Confederate government. At the outbreak of the War of Secession, the small band of Union soldiers who occupied the garrison departed, leaving the place to the militia from Virginia under General Johnston. Two months later, Johnston abandoned it, and Union soldiers again took possession. For over a year they occupied the town, until, on September 15, 1862, General Jackson captured it, taking 12,520 prisoners. At present the population numbers about 750. See BROWN, JOHN, and illustration, page 3051.

**HARPIES**, *hahr' piz*, in Greek mythology, the ministers of divine vengeance, who defiled everything they touched. A harpy was represented as a winged monster, having the face and body of a woman, the wings of a bird of prey, and feet and fingers armed with sharp claws. The harpies were generally supposed to be two or three in number, but occasionally several others were mentioned; Homer refers to but one. Originally, they were conceived to be storm winds, their repulsive aspect as winged monsters being a later conception.

**Derivation.** The word *harpies* is from a Greek word meaning to *snatch*.

**HARPOON**, *hahr poon'*. See WHALE (Whaling Industry).

**HARPSICHORD**, *hahrp' si kawrd*, a keyed and stringed musical instrument, now little known. The modern piano is an evolution of the harpsichord, and in appearance and internal arrangement, the two are somewhat similar. The keys, all of one color, were in front, the long ones being the naturals and the short ones the sharps and flats. The date of the



WILLIAM R. HARPER

invention of the instrument is uncertain, but it was introduced into England early in the seventeenth century. See PIANO.

**HARPY**, a large bird of prey related to the eagles, and named after the harpies in mythology (see HARPIES). It is about forty-two inches long, and has large powerful talons and a strong, hooked beak. This active bird swoops down after small animals and birds, then snatches them up in its talons and devours them. It is grayish in color, barred with black, and has a white breast, while its white head has a dark crest. The harpy is a native of tropical America, from Southern Mexico to Brazil. It makes its nest in a tall tree or on the ledge of a high cliff, where it lays five eggs.

D.L.

**Scientific Name.** The scientific name of the harpy is *Thrasæëus harpyiu*.

**HARRADEN, BEATRICE** (1864- ), an English author, whose first novel, *Ships That Pass in the Night*, was an immediate success. She was graduated from the University of London at the age of twenty-one. She wrote *Ships That Pass in the Night* when she was so ill that she could not hold a pen, and was obliged to use a peculiar device that she held in the palm of her hand. The lines that suggested its title occur in Longfellow's *Tales of a Wayside Inn*:

Ships that pass in the night, and speak each other in passing,  
Only a signal show and a distant voice in the darkness.

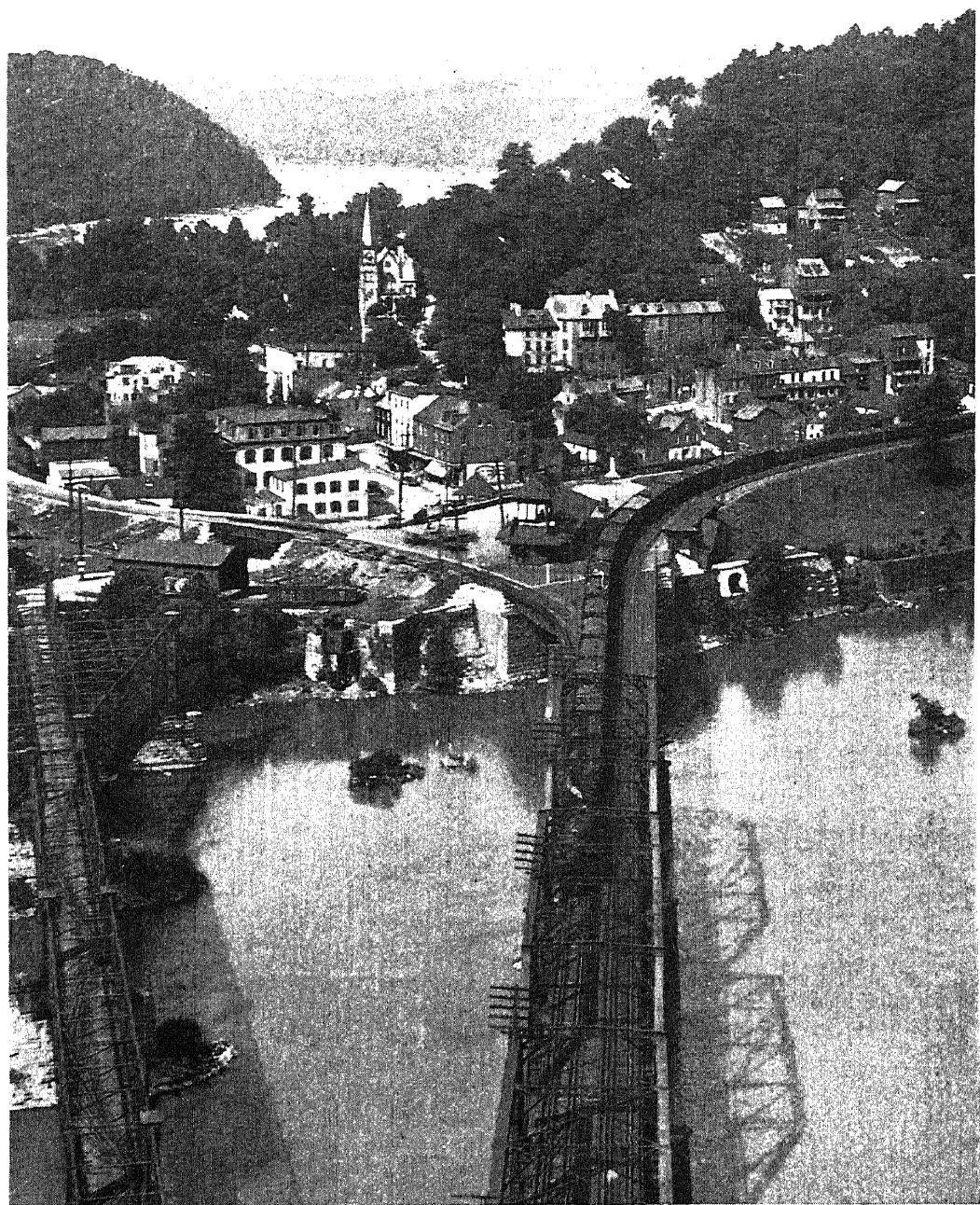
So on the ocean of life, we pass and speak one another,  
Only a look and a voice, then darkness again and silence.

The book was published in 1893 and passed through many editions. Her next book, *At the Green Dragon*, elicited the interest of England's queen, who inquired about the author. In 1894 Miss Harraden visited the United States and lived for a time on a California ranch. Her other novels include *In Varying Moods*, *The Flower*, *Hilda Strafford*, *Where Your Treasure Is*, *Spring Shall Plant*, and *Patuffa*, besides which she wrote many short stories.

**HARRAR**, *hahr ahr'*, a city of Ethiopia (which see).

**HARRIER.** See MARSH HAWK.

**HARRIMAN, hair' i man**, EDWARD HENRY (1848-1909), an American capitalist and railroad-builder, born at Hempstead, L. I. After a common-school course, he became a clerk in a New York brokerage office, and at the age of twenty-two had accumulated enough money to buy a seat on the New York Stock Exchange. Besides winning a fortune through speculation, he showed so thorough an understanding of American railways that in 1883 he was elected a director of the Illinois Central Rail-



HISTORIC HARPER'S FERRY

Photo: Keystone

road. In 1887 he became vice-president of the road, and in this position he displayed extraordinary executive ability. In 1898 Harriman secured the financial backing of a great New York banking house, through which he gained control of the Union Pacific, then in an impoverished condition. His success in restoring this road to a prosperous condition led to further acquisitions, so that, at his death, he controlled at least 60,000 miles of road. Harriman's competitive methods frequently met with criticism, and in 1907 received severe public denunciation from President Roosevelt; but whatever his methods, he vastly improved American transportation facilities.

**HARRIOTT, MRS. F. C.** See MORRIS, CLARA.

**HARRIS, CORRA MAY WHITE** (1869- ), an American writer of fiction and special articles, born at Farm Hill, Ga. She was educated at home, and in 1887 married the Reverend Lundy Howard Harris. Two years later, she began contributing to American periodicals, and has continued such writing, in addition to publishing numerous works of fiction and several of autobiography. Mrs. Harris writes with force and clarity, and exhibits keen insight into human nature and its foibles.

**Her Writings.** These include *A Circuit Rider's Wife*, *A Circuit Rider's Widow*, *Eve's Second Husband*, *Recording Angel*, *In Search of a Husband*, *Making Her His Wife*, *My Son, Daughter of Adam*, *My Book and Heart*, *As a Woman Thinks*, *Flapper Anne*, and *Happy Pilgrimage*.

**HARRIS, JOEL CHANDLER** (1848-1908), an American story-writer whose tales of "Uncle Remus," "Br'er Fox," and "Br'er Rabbit" have made him a favorite with youthful readers. "Br'er Rabbit" is the hero of these stories, and the clever tricks by which he outwits the sly "Br'er Fox" rouse the keenest and most gleeful delight in his little admirers. Children are not alone in finding pleasure in "Uncle Remus'" tales. To the student of negro folklore, these are a mine of intimate, faithful information, possessing a genuine scientific value. Harris was born at Eatonton, Ga., was apprenticed to a printer, and later studied law. The instinct for writing was strong in him, however, and he turned to journalism, beginning in 1876 that connection with the Atlanta *Constitution* which lasted twenty-five years.



E. H. HARRIMAN

Photo: Brown Bros.

**His Writings.** Harris's "Uncle Remus" tales, contributed to the *Constitution*, were so successful that he published them in book form in 1880 as *Uncle Remus: His Songs and Sayings*, and later followed this first volume with *Nights with Uncle Remus* and *Told by Uncle Remus*. He also wrote *Georgia from the Invasion of De Soto to Recent Times*, a life of Henry W. Grady, *Daddy Jake the Runaway*, *The Tar-Baby and Other Rhymes*, *Aaron in the Wildwoods*, and *Tales of Home Folks*.

**HARRIS, PAUL PERCY.** See ROTARY CLUBS.

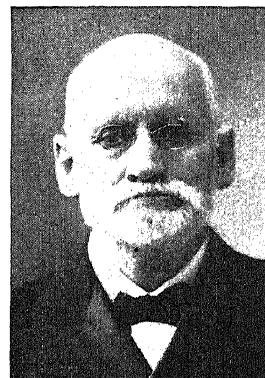
**HARRIS, WILLIAM TORREY** (1835-1909), an American educator and philosopher, the second Commissioner of Education of the United States. He was born in Connecticut and was educated at Phillips Andover Academy and at Yale College. In 1867 he became superintendent of the Saint Louis public schools, remaining there twenty-one years. Between 1889 and 1906, in the office of United States Commissioner of Education, he proved himself able and practical, rendering notable service to the development of American education.

See EDUCATION (United States Bureau of Education).



JOEL CHANDLER HARRIS

Photo: Brown Bros.

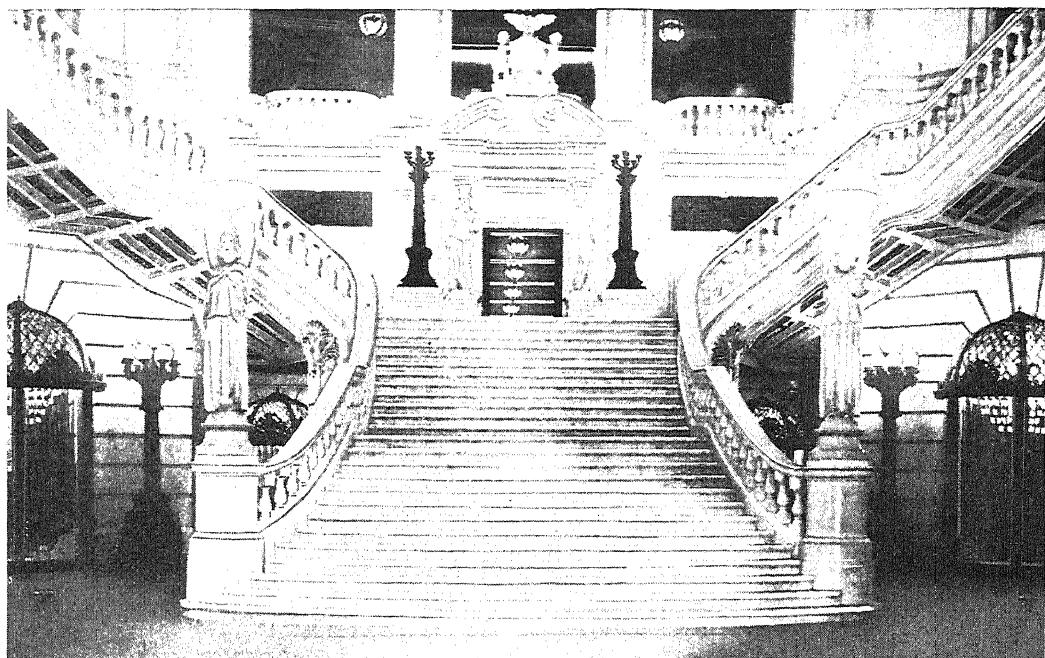


WILLIAM T. HARRIS

For seventeen years United States Commissioner of Education.

**Editor and Writer. Dr.** Harris founded, in 1867, the *Journal of Speculative Philosophy*, the first periodical of its kind in the English language. He was chief editor of the *International Education Series* and of *Appleton School Readers*, editor of the department of philosophy in *Johnson's Encyclopedia*, and editor in chief of *Webster's New International Dictionary*. In addition, he was the author of numerous works on philosophy and education.

**HARRISBURG, PA.**, the state capital and the county seat of Dauphin County, is located on the east bank of the Susquehanna River, southeast of the geographical center of the state. It is 105 miles west and north of Philadelphia. Population, 1928, 86,900 (Federal estimate).



STAIRWAY IN THE CAPITOL, HARRISBURG

The Capitol building, surrounded by a park of fifteen acres, occupies a prominent site in the city. It is constructed of steel and brick, veneered with granite on the exterior and finished on the inside in marble. On its walls are mural paintings by Edwin A. Abbey, John W. Alexander, Miss Violet Oakley, and W. B. Van Ingen, who also designed the stained-glass windows for the House Chamber. George Grey Barnard designed two large groups of statuary for the building.

**Transportation.** The city is on the Pennsylvania and the Reading Company railroads. There is interurban and motorbus service. At this point the river is a mile wide and is crossed by several concrete bridges.

**Industries.** Harrisburg is near large iron and coal mines, and this location, together with excellent railroad facilities, has led to the extensive manufacture of iron and steel products.

The city has diversified industries, including knitted-goods

and hosiery mills, foundries and machine shops, rolling mills, furnaces, manufactories of bookkeeping machines, boot-and-shoe factories, pipe-bending works, and large manufactories of lumber products, brick and tile, and marbleized slate. A river fleet salvages coal from the Susquehanna's bed, placing power production on an economic basis. Several thousand men are employed in the roundhouses and repair shops of the Pennsylvania Railroad.

**History.** The town of Harrisburg was named in honor of John Harris, who settled there in 1726, near what he considered a good ford of the river. It was organized in 1785 by his son, who had established a ferry at this place, and was made the county seat in 1785, becoming the state capital in 1812. In 1860 it became a city. The Harrisburg Convention, assembled here in 1828, was responsible for the high-protective-tariff bill of

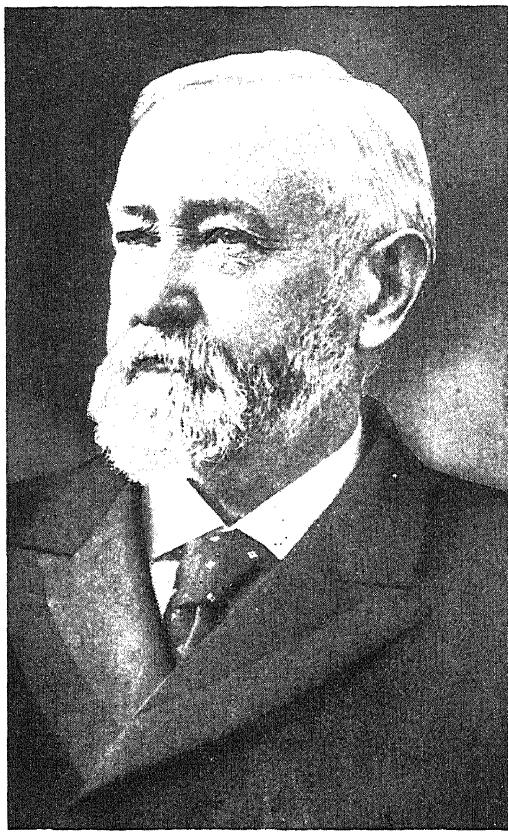
that year. Harrison and Tyler were nominated in the city in December, 1839. R.W.C.



**HARRISON, BENJAMIN** (1833-1901), an American lawyer, soldier, and statesman, the

twenty-third President of the United States. Like nearly all the Presidents, Harrison was a

lawyer by profession, but he differed from them in that he was not a politician or a political leader. With the exception of the Presidency, Harrison held but two public offices in his life, and one of these, that of reporter of the Indiana



BENJAMIN HARRISON

Photo: U &amp; U

His ancestors were distinguished. One was a Revolutionary patriot and signer of the Declaration of Independence; another was a military hero and also a President of the United States.

supreme court, was strictly in the line of his profession. He was a loyal member of the Republican party and took an active interest in politics, but he was not, strictly considered, a popular leader. As a soldier in the War of Secession, he had won considerable distinction, but his military career lacked the spectacular element which played so large a part in the career of his grandfather, William Henry Harrison, who also was President, but for only a month.

Benjamin Harrison was a hard-working, conscientious official, but he did not inspire enthusiasm. He was called "cold," so cold that "grass would not grow on the White House grounds," facetiously declared his enemies, and it was further said, most unkindly, that "his political advisers rode in ice wagons." Such exaggeration was ridiculous, but there is

no doubt that Harrison's integrity, his devotion to principle, and his refusal to recognize the demands of "everyday political expediency," all combined to give him an air of aloofness. In some respects he was not unlike Grover Cleveland, his predecessor and his successor, and it is noteworthy that both men won their greatest personal popularity after the close of their terms of office.

**Youth and Education.** Benjamin Harrison was born on August 20, 1833, at North Bend, O., where his grandfather, William Henry Harrison, was also then living. He was named for his great-grandfather, one of the signers of the Declaration of Independence. His father, John Scott Harrison, was Representative in Congress from 1853 to 1857, but took no other part in public life; it has been said of him, somewhat uncharitably, that his only claim to distinction was that he was "the son of a great father and the father of a great son." Young Benjamin spent his boyhood on his grandfather's farm, and during the winters received education in the near-by log schoolhouse. Later, he was instructed by a private tutor, studied for two years at an academy near Cincinnati, and in 1852 was graduated from Miami University. A year later he was admitted to the bar, and in 1854 removed to Indianapolis, Ind., which was thereafter his home.

**As a Lawyer and Soldier.** When young Harrison went to Indianapolis, he had only one acquaintance in the whole community; that man, the clerk of the Federal court, gave him desk space, and allowed him to hang his legal sign at the door. For a short time Harrison was content to act as court crier at \$2.50 a day, but when clients began to come to him, he quickly proved his industry and ability. He had the advantage, moreover, of a distinguished name, and in a few years he took high rank at the bar.

The War of Secession interrupted Harrison's legal career. When it began, he was acting as reporter of the Indiana supreme court, his first public office. At the end of his two-year term, in 1862, he accepted a military commission as second lieutenant of volunteers. He at once helped to raise a new regiment, the Seventieth Indiana, and when it was completed, in August, 1862, he was commissioned its colonel. His regiment participated in numerous engagements in Kentucky and Tennessee in 1862 and 1863, was with Sherman in the campaigns around Atlanta, and with Thomas in the battles around Nashville in 1864. He commanded a brigade at the battles of Kenesaw Mountain, Peach Tree Creek, and Nashville, and his leadership in these battles won him praise and the brevet rank of brigadier general, for "ability and manifest energy and gallantry."

In 1864, while still in the field, Harrison was again chosen reporter of the Indiana supreme

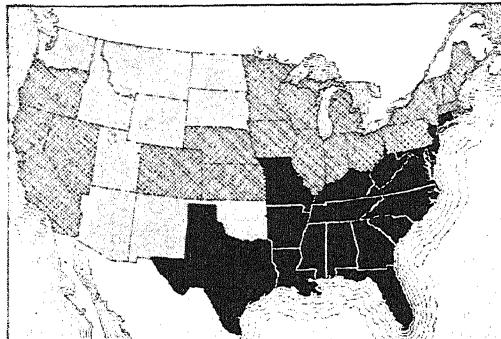
court, and after the war ended, he performed the duties of this office for three years. He refused to be a candidate for re-election in 1868, and returned to the private practice of law. In 1876 he was the Republican candidate for governor, but his candidacy was undertaken from a sense of duty when the regular nominee declined to run. Though his defeat was a foregone conclusion, he ran 2,000 votes ahead of his ticket. In 1879 President Hayes appointed him a member of the Mississippi River Commission, under whose direction extensive river improvements were to be made. In the next year, he was active in securing the nomination and election of James A. Garfield to the Presidency, and was offered a place in Garfield's Cabinet. This he declined, preferring to take a seat in the United States Senate, to which the Indiana legislature had just elected him.

**In the Senate.** Harrison's ability and his capacity for hard work showed to his advantage in the Senate. He was chairman of the Committee on Territories, and urged the admission into the Union, as states, of the five territories, North and South Dakota, Washington, Idaho, and Montana. He was also at various times a member of the committees on Foreign Relations and on Military and Indian Affairs. He was strongly in favor of a greater navy, of civil-service reform, and of larger pensions for ex-soldiers. His demand for larger pensions brought him into conflict with President Cleveland, who was vetoing a great number of pension bills. In the Indiana elections of 1886, the Democrats won control of the legislature, although the Republicans polled a majority of the popular vote, and Harrison was defeated for re-election to the Senate. The general feeling among Indiana Republicans was that Harrison was unjustly deprived of his Senatorship, and in compensation, as the Presidential election of 1888 drew near, he became Indiana's "favorite son." The leader of the Republican party, James G. Blaine, declined to be a candidate for President, and Harrison was nominated on the eighth ballot at the national convention.

The campaign was waged chiefly on the tariff issue, the Republicans declaring themselves "uncompromisingly in favor of the American system of protection." The Democrats, who had nominated President Cleveland for re-election, demanded "the reduction and correction of the burdens of taxation"; in other words, the latter demanded tariff reform. Somewhat to the nation's surprise, Harrison was chosen by an electoral vote of 233 to 168 for Cleveland, although Cleveland received 100,000 more popular votes than Harrison, who thus became one of America's minority Presidents.

**His Administration (1889-1893).** At its first session after Harrison's inauguration, Congress

undertook to fulfill the campaign promises of the Republicans, and within a year placed on the statute books the Sherman Silver Purchase Act, the McKinley Tariff Act, and the Sherman Anti-Trust Act. These laws were supported by a very small majority in the House of Representatives, and would probably have



ELECTION OF 1888

Shaded states, Republican, elected Harrison; states shown in black, Democratic, voted for Cleveland. Light, unshaded divisions represent non-voting territories.

failed to pass except for a change in the rules by which the House managed its affairs. Previously, it was possible for members to delay definite action on any bill by filibustering, that is, either by making irrelevant and unnecessary motions, or simply by refusing to answer to their names when called on to vote. Unless a majority answered to their names, it was the practice to rule that a quorum was not present. Speaker Thomas B. Reed, largely with the assistance of William McKinley and Joseph G. Cannon, forced the House to adopt the so-called "Reed rules," which greatly increased the Speaker's power. Thenceforth, the Speaker could suppress or disregard unnecessary motions, and was allowed to count members who were present but not voting, in order to make a quorum. These changes laid the basis for the development of the Speaker's power, which only came to an end with Speaker Cannon, in 1910.

The McKinley Tariff Act was named for its author, later President of the United States. It provided a high protective tariff on imports, the exact reverse of the Democratic principle of "tariff for revenue only." The public did not regard the law as satisfactory, and expressed its disapproval in the autumn elections of 1890 by giving the Democrats a majority in the House of Representatives. Another law of 1890 was the Sherman Anti-Trust Law, one of the most important laws passed by Congress since the War of Secession.

John Sherman, the author of the Anti-Trust Act, was chairman of a committee in the Senate which reported for passage a new Silver

## OUTLINE AND QUESTIONS ON BENJAMIN HARRISON

### Outline

#### I. Years of Preparation

- (1) Birth and family
  - (a) His great-grandfather signed Declaration of Independence
  - (b) His grandfather was President
- (2) Education
- (3) Early legal practice

#### II. Early Public Life

- (1) Reporter of Indiana supreme court
- (2) Military career
- (3) Candidate for governor
- (4) Member of Mississippi River Commission
- (5) In the United States Senate
  - (a) Activity in pension debate
- (6) Election to Presidency
  - (a) The issue
  - (b) Results

#### III. Administration

- (1) Legislation
  - (a) Sherman Silver Purchase Act
  - (b) McKinley Tariff Act
  - (c) Sherman Anti-Trust Act
  - (d) Chinese Exclusion Act renewed
- (2) Other governmental affairs
  - (a) "Reed rules" adopted in the House
  - (b) "Spending the surplus"

- 1. Great increase in pension fund
- 2. Appropriation of money for new battleships
- (c) Oklahoma opened for settlement
- (d) Admission of states to Union
  - 1. North Dakota
  - 2. South Dakota
  - 3. Montana
  - 4. Washington
  - 5. Idaho
  - 6. Wyoming
- (3) Foreign affairs
  - (a) International Copyright Act
  - (b) Pan-American Congress
  - (c) Bering Sea Controversy
  - (d) Friendship with Italy threatened by Mafia trouble in New Orleans
    - 1. Indemnity paid by United States
  - (e) The dispute with Chile
  - (f) Controversy over Samoa
  - (g) Attempt to annex Hawaii
  - (h) Reciprocity treaties with Spain and Brazil
- (4) Other events
  - (a) Australian ballot system adopted
  - (b) Great flood at Johnstown, Pa.
  - (c) Homestead riots
- (5) Election of 1892
  - (a) Candidates
  - (b) Issues
  - (c) Result

### Questions

Were William Henry Harrison and Benjamin Harrison related to each other? On what subject did Harrison come into conflict with the President that preceded him?

When did Harrison decline a high official position, and for what reason? Why were the expenses of the government much heavier at the close of Harrison's administration than at the beginning?

When was the expression "ability and manifest energy and gallantry" applied to him?

What was the chief issue in both campaigns in which Harrison was a candidate? What important part did Blaine play during this administration?

What important act of this administration was drawn up by and named for a future President of the United States?

What country had to apologize to the United States and to what country did the United States have to apologize during this administration?

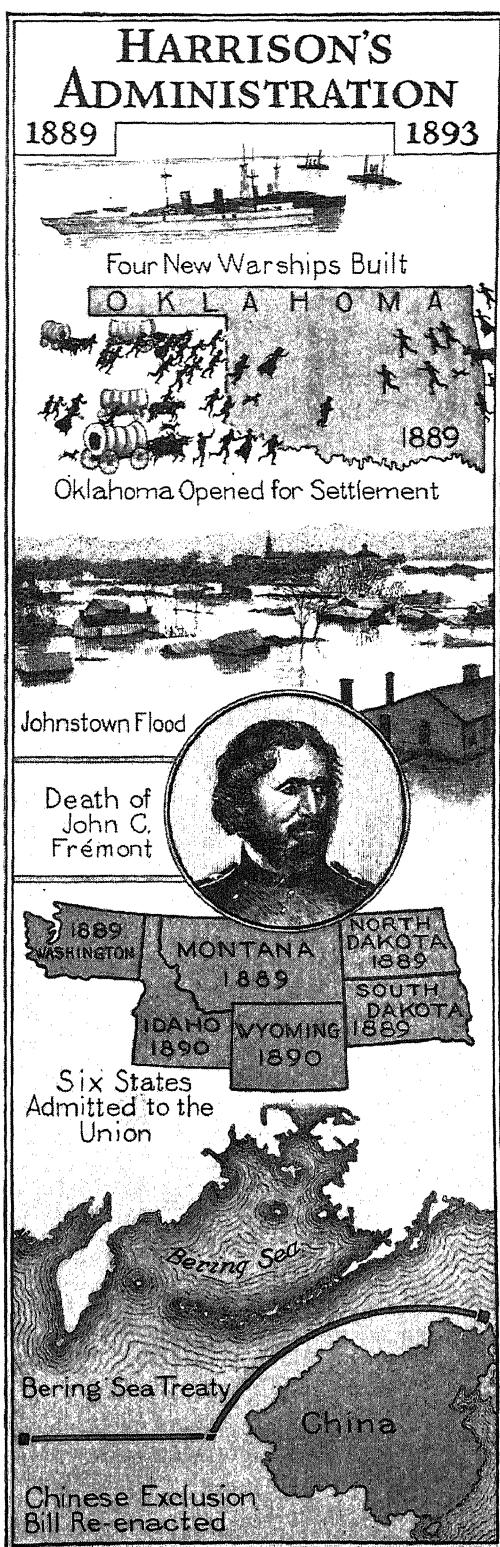
What is filibustering, and what part did the "Reed rules" have in doing away with it?

In what way did the opening of Oklahoma to settlement affect the growing West? How did Benjamin Harrison answer the question, "What shall we do with our ex-Presidents?"

Purchase Act. The Bland-Allison Act of 1878, which required the Treasury to buy \$2,000,000 worth of silver each month, no longer satisfied the silver interests, which were already demanding the free and unlimited coinage of silver. So strong were the "silverites" in both houses of Congress that further legislation was inevitable. Harrison proposed a compromise, which was adopted in the Sherman Act. The Secretary of the Treasury was required to buy 4,500,000 ounces, or about 140 tons, of silver each month, and to issue treasury certificates in exchange, to the full market value of the bullion. While it is now generally admitted that the law was a mistake, and was at least partly responsible for the panic of 1893, it had one good result in that it showed the impossibility of compromise, and brought the country to face a clear-cut issue between the gold standard and the free coinage of silver.

*The Surplus and Its Reduction.* For a number of years, the United States Treasury had been confronted with a growing surplus of gold in reserve; in other words, the government was receiving more money than it was spending. During Harrison's administration, Congress passed several laws which materially altered the situation. The laws were not passed primarily because there was a surplus, but without the surplus they would certainly not have been passed. One of the ostensible purposes of the McKinley Tariff Act was to reduce the revenue, but this it failed to accomplish. The most effective means taken to reduce the surplus was the Dependent Pension Bill of 1890. Harrison had long been in favor of more liberal pensions, and in response to his views, Congress authorized pensions for all Federal soldiers who had served ninety days in the War of Secession and were now incapacitated, for any reason whatever, from earning their living. This act nearly doubled the number of pensioners, and the pension fund has ever since been a very large item of government expenditure. Congress also appropriated large sums of money for new battleships, and the "new navy," as it is known, dates from 1890. The first of the modern steel battleships in the American navy were begun in that year.

*Development of the West.* In 1889 and 1890, six new states were admitted to the Union—North Dakota, South Dakota, Montana, and Washington in 1889, Idaho and Wyoming in 1890. Wyoming was the first state admitted to the Union with a constitution granting women and men equal rights in voting and office-holding. The year 1889 was also noteworthy for the opening of Oklahoma, on April 22. Oklahoma, the Indians' "Beautiful Land," lay in the heart of the Indian Territory, but the government purchased the rights of the tribes and threw the land open to settlement. An army of settlers camped for days and even



weeks along the boundary. At noon on April 22, 1889, at the sound of a bugle, the multitude surged across the line, and by the end of that day Oklahoma was the home of 50,000 settlers. This day summarized in dramatic fashion the settlement and expansion of the United States. With the exception of a few scattered Indian reservations, the stream of population had now covered the entire United States. There was no longer a frontier, and settlements extended from ocean to ocean.

*Foreign Relations.* While the development of the West was continuing, there was also during Harrison's administration a marked development of interest in the foreign relations of the United States. This was due partly to James G. Blaine, the Secretary of State, and partly to a combination of incidents which threatened to involve the United States in war. Under Blaine's leadership, the first Pan-American Congress was held at Washington, and reciprocity treaties were negotiated with Spain and Brazil. The International Copyright Act of 1891 removed a long-standing injustice by allowing foreigners, under certain conditions, to copyright their literary productions in the United States. This was a subject in which Charles Dickens had taken an intense interest during his visit to the United States in 1842.

During Harrison's term of office, the United States had disputes with four nations, and Congress passed a law which was most displeasing to a fifth. This law was the Chinese Exclusion Act of 1892, prohibiting Chinese immigration for a further period of ten years and requiring Chinese residents in the United States to be registered. The most serious of the four disputes, which was with Great Britain, involved the respective rights of British and American citizens in the seal fisheries of Bering Sea, off the coast of Alaska. In June, 1891, both nations agreed on a closed season, and submitted the disputed points to arbitration. Friendly relations with Italy were nearly broken by an anti-foreign riot in March, 1891, in New Orleans, where eleven Italians were taken from jail and hanged. The United States government expressed its regret, but was unable to promise, as Italy demanded, that the leaders of the mob be punished. Their offense, under the circumstances, could be punished only by the state of Louisiana. The Italian minister then demanded his passports and left Washington, but the matter was finally settled by the payment of \$25,000 to the families of the dead Italians. During this administration labor riots occurred in Homestead, Pa.

In a dispute with Chile, the situation was reversed, for the United States was compelled to demand apology for an attack on several American sailors by a mob in Valparaiso. A dispute with Great Britain and Germany over

Samoa was settled amicably by the Treaty of Berlin, February 4, 1890. One of the most important events of the administration was the attempted annexation of Hawaii.

*Presidential Election of 1892.* The chief issue of the campaign was the tariff, on which the Republicans reaffirmed their high-tariff belief, while the Democrats again demanded a tariff for revenue only. Harrison was renominated by the Republicans, and Grover Cleveland by the Democrats. A third party, the People's party, or Populists, voiced the discontent of the agricultural communities of the West, and declared itself in favor of free coinage of silver, a graduated income tax, state control of railroads, and government loans to the farmers. The Populist candidate for President, General James B. Weaver of Iowa, received over 1,000,000 popular votes, but only twenty-two in the electoral college. No candidate received a majority of the popular vote, but Cleveland was elected by 277 electoral votes to 145 for Harrison. The Democrats also secured control of both houses of Congress.

*Last Honors.* After being relieved of the burdens of office, Harrison seemed almost instantly to broaden his views, and the people as a whole listened to his opinions with increasing respect. He delivered a course of lectures at Leland Stanford Junior University, wrote *This Country of Ours*, an interesting study of the practical workings of the United States government, and was a frequent contributor to magazines. He renewed his practice of law, and appeared in several cases of international importance. He was counsel for Venezuela before the arbitration commission which settled the boundary dispute between that country and Great Britain, and in 1899 was the principal representative of the United States at the Hague Conference. Harrison's death occurred after a brief illness, on March 13, 1901, at Indianapolis. E.D.F.

Caroline Scott Harrison (1832-1892), daughter of Professor John Scott of Miami University and wife of the twenty-third President. She married Benjamin Harrison in 1853, the year in which he was admitted to the bar. The couple had two children, both of whom were grown and married when their parents entered the White House. However, the White House family numbered more than ten persons during most of the administration; Mrs.

Harrison's father, Mary Harrison McKee, her husband, and their two children were members of the household. The President, who was considered cold



Photo: U & U

CAROLINE HARRISON

and austere, and his frail wife idolized their children and grandchildren; it was during this administration that the first Christmas tree was set up in the White House. It was decorated and hung with gifts for every member of the family and the staff.

Mrs. Harrison was able to preside over only the most formal official functions, and in October, 1892, she died in the White House. Burial was in the family vault in Indianapolis.

Mary Dimmick Harrison (1858- ), niece of the first Mrs. Harrison and widow of Walter Erskine Dimmick, had made her home in the White House

for two years before her aunt's death. She was married to Benjamin Harrison in 1896; they had one child, Elizabeth Harrison, born in 1897.

**Related Subjects.** The reader who desires additional information on matters affecting this President and his times is referred in these volumes to the following articles:

Bering Sea Controversy

Pension

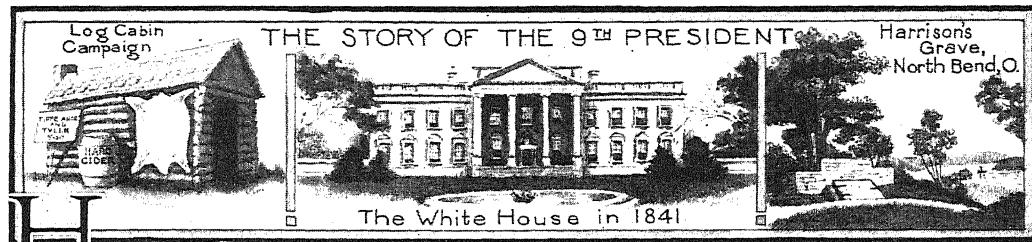
Cannon, Joseph G.

Reed, Thomas B.

Pan-American Congress

Trust (Legislation)

**HARRISON, N. J.**, See NEW JERSEY (back of map).



**H**ARRISON, WILLIAM HENRY (1773-1841), an American soldier, administrator, and political leader, ninth President of the United States and the first President to die in office. He was the son of Benjamin Harrison, signer of the Declaration of Independence, and grandfather of another Benjamin, who became the twenty-third President. William Henry Harrison was the nation's chief executive for exactly one month; his death occurred on April 4, 1841, making his administration the shortest in the history of the United States. He was inaugurated on March 4, and immediately sent to the Senate his nominations for Cabinet officers, which were confirmed. His Cabinet was an able one, including Daniel Webster as Secretary of State, Thomas Ewing of Ohio as Secretary of the Treasury, John Bell of Tennessee as Secretary of War, and John J. Crittenden of Kentucky as Attorney-General. On the seventeenth of March, the President issued a call for a special session of Congress to consider measures for improving business and financial conditions. Ten days later he caught a severe cold, which developed into pneumonia, and at the end of the next week, the nation was shocked by the news of his death. His body was interred in the Congressional Cemetery at Washington, but a few years later was removed to his old home, North Bend, O., where it was placed in a tomb overlooking the Ohio River.

Harrison's Presidency was the least important period of his life. It is rather as a soldier and administrator that history records his fame. He was one of the few who won military distinction between the close of the Revolutionary War and the end of the War of 1812. In fact, with the exception of Andrew Jackson and Winfield Scott, he was the only officer in

the American army during the War of 1812 to add to his reputation. He was a clever negotiator with the Indians and was generally regarded as their friend, yet when occasion required, he could fight them as well, as his victory at Tippecanoe showed. He was for eleven years governor of Indiana Territory, which then included about six times the area of the present state, and on this whole region he left the impress of his ability. It was this pioneer section, simple and democratic, which Harrison represented to the nation at large.

**Boyhood and Early Career.** It must not be supposed that Harrison was an uneducated backwoodsman. He was born on February 9, 1773, at Berkeley, Va., where his father also was born. The Virginia Harrisons were aristocrats and among the best-known families in the colonies. Public service was a tradition in the Harrison family, as it was among the Lees of Virginia and the Adams family of Massachusetts. Young Harrison was given a sound education, and was graduated from Hampden-Sidney College in 1790. His father insisted that he begin the study of medicine, but the death of the elder Harrison, in 1791, released the boy from a future which he dreaded. Washington approved his purpose to be a soldier, and in August, 1791, commissioned him an ensign in the First Infantry, then stationed at Fort Washington, Ohio.

During the next seven years, Harrison served in various campaigns against the Indians. In 1792 he was appointed lieutenant and aid-de-camp to General Anthony Wayne, and Wayne's victory over the Indians in the battle of Fallen Timbers, on the Maumee River, was due in part to the plan of march suggested by Lieutenant Harrison. In May, 1797, Harrison was promoted to the rank of captain, and placed in

command of Fort Washington, where he remained until he resigned his commission in June, 1798.

Immediately after his resignation from the army, President John Adams appointed him

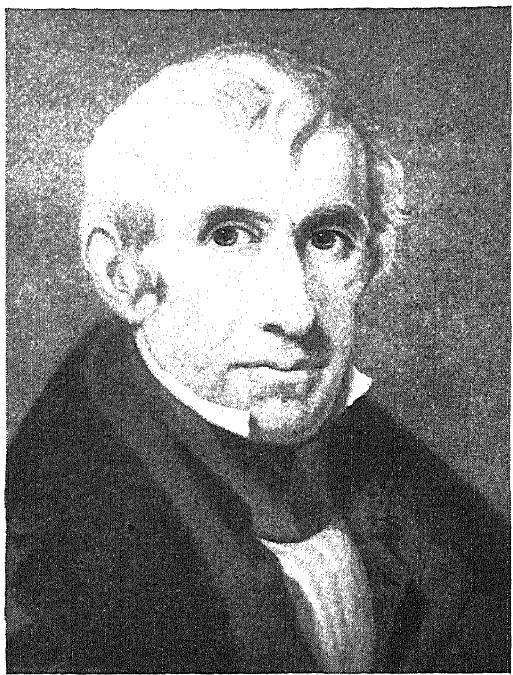


Photo: U & U

WILLIAM HENRY HARRISON

Son of Benjamin Harrison, member of the Continental Congress in 1776 and a signer of the Declaration of Independence; grandfather of Benjamin Harrison, who became President in 1889.

secretary of the Northwest Territory, under General Arthur St. Clair, as governor. After a year he resigned this position to take his seat in Congress as the first delegate from the Northwest Territory, and the first delegate from any territory of the United States. Up to this time the public lands in the West had been sold only in large tracts, a practice which favored the rich and made it impossible for the poor man to obtain a homestead. Through Harrison's efforts, Congress authorized the division of land into small tracts and thus laid the foundation of the homestead laws. He was also instrumental in securing the division of the Northwest into two parts. The western part, or Territory of Indiana, included the present states of Wisconsin, Michigan, Illinois, and Indiana, and in 1801 Harrison was appointed its first governor and superintendent of Indian affairs. So satisfactory were his services that he was re-appointed by Presidents Jefferson and Madison, and held the position until 1812.

**Governor of Indiana Territory.** At the time of Harrison's appointment in 1801, the Terri-

tory of Indiana had a widely scattered population of nearly 5,000 people. Harrison's task was not merely to give these people a government, but to keep peace with the Indians and thereby open the West to more settlers. Within a year he had established friendly relations with several of the Indian tribes, and in all he negotiated thirteen treaties, by which the Indians ceded to the United States more than three million acres of land along the White and Wabash rivers. While the questions of land rights and the relations of the Indians to the new government were thus being adjusted, this very adjustment led to the most serious difficulty Harrison had to face.

The various cessions made by the tribes were bitterly condemned by a few prominent chiefs, among them Tecumseh, a chief of the Shawnees, on the ground that the consent of all the tribes, not of one or several, was necessary to make a legal sale. Agents of the British government, the action of a few speculators who drove Indians from their lands, and the violent preaching of Tecumseh's brother, Ellskwatawa, commonly called "the Prophet," all combined to spread discontent among the tribes.

In an attempt to avert an Indian uprising, Harrison invited Tecumseh to a two-day conference at Vincennes, the territorial capital. The chief arrived at Vincennes on August 12, 1810, not with thirty men, as requested, but with 400 armed warriors. It required all Harrison's coolness to prevent bloodshed on the first day of the council; when the meeting came to an end without result, Harrison, unarmed and accompanied only by an interpreter, made a visit to Tecumseh's camp, in the hope that the chiefs would feel less hostile when they were not under the guns of the fort. The daring of the visit of two unarmed men, walking coolly into the midst of a band of savages merely waiting for a signal to kill every white man, impressed the Indians but did not change their minds. In the following spring, Indian thefts and plundering became so frequent that Harrison threatened punishment if the raids did not cease. At another council, in the summer of 1811, Tecumseh professed his friendliness to the white men; but Harrison, now convinced of the chief's double-dealing, won over the government at Washington to his plan for checkmating the Indians.

Harrison's purpose was to build a fort on the Wabash River not far from Tippecanoe, where "the Prophet" had established his village. The announcement of this plan brought several hundred volunteers to Vincennes, and in September, 1811, Harrison with 900 men left the capital. Near the site of Terre Haute he built Fort Harrison, and, leaving a garrison there, pressed on to Tippecanoe. On the sixth of November, the little army had reached a point about a mile and a half from the Indian

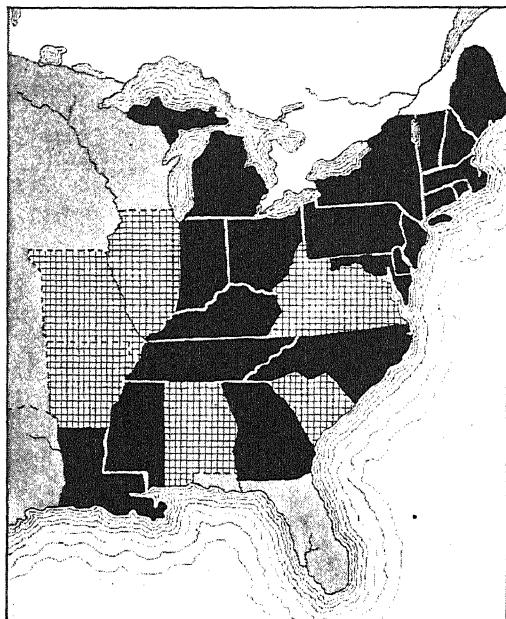
camp, when it was met by messengers who requested a council. The next day was fixed for a meeting, but early in the morning the Indians attacked. The fighting continued for two hours, until daylight, when the Indians were driven from the field by a charge. This victory at Tippecanoe made Harrison a national hero, and was responsible, more than anything else, for his election to the Presidency twenty-nine years later.

In the War of 1812. The Battle of Tippecanoe was followed by a general uprising of the Indians, and in the summer of 1812 the United States found itself at war with the British as well. War was declared in June, and on August 25 Harrison was appointed major general of the Kentucky militia, although he was not a citizen of that state, and took command of a detachment intended to relieve General Hull at Detroit. While on the march, he received notice of his appointment as brigadier general of the regular army. He had proceeded as far as Fort Wayne when word came that he was to have the chief command in the Northwest. The letter of the Secretary of War instructed him to "exercise your own discretion, and act in all cases according to your own judgment." Such wide powers had been given to no other American commander since Washington.

The new commander prepared to concentrate his forces and march on Detroit, but various difficulties postponed this advance until the next year. Through a misunderstanding of orders, a part of his forces was lost in the bloody massacre on Raisin River. Harrison then established Fort Meigs, where he was besieged in May, 1813, and again in July, by a superior force under the British Colonel Proctor. Meanwhile, Harrison had been urging the construction of a fleet on Lake Erie, and Perry's naval victory, resulting from this foresight, opened the way to Canada for the American army. It was to General Harrison that Perry sent his laconic message, "We have met the enemy and they are ours: two ships, two brigs, one schooner, and one sloop."

Harrison's army was now transported across Lake Erie in Perry's ships, and on September 27 landed on Canadian soil. In the Battle of the Thames, October 2, the British were decisively defeated, and Tecumseh, their brave ally, was killed. Together with Perry's victory, this battle ended the war of the West. In the next year, the Secretary of War assigned Harrison to a military district in which he could see no active service, and even issued orders to one of his subordinate officers without consulting Harrison. This combination of slights induced the latter to offer his resignation, which, in the temporary absence of President Madison, was promptly accepted.

A Quarter Century of Varied Activity. Though Harrison's military career was at an end, he remained more or less in the public eye. Immediately after his resignation from the army, President Madison appointed him to



ELECTION OF 1840

States shown in black were Whig, electing Harrison and Tyler; cross-hatched, Democratic, voting for Van Buren. The lighter-shaded areas were territorial possessions.

negotiate a treaty with the Indians, and in the following year again employed him on a similar errand. From 1816 to 1819, he served in Congress as Representative from Ohio, and from 1819 to 1821 was a member of the state senate. He was elected United States Senator in 1825, but resigned in 1828 to become first minister to Colombia. As a diplomat he was not very successful, and in 1829 he was recalled, being one of the first victims of Jackson's to-the-victor-belong-the-spoils policy, as opposed to civil service.

On his return from Colombia, he lived in semi-retirement at his home in North Bend, O. He delivered occasional speeches on political topics, and was frequently mentioned as a possible candidate for public office. For several years he was clerk of the county court of Hamilton County, a remunerative position which was most acceptable to him, for he was far from wealthy. In the Presidential election of 1836, he received the largest vote of the candidates opposing Van Buren. His candidacy had not been pushed, and his popular strength was a surprise to everyone. His showing in this campaign and his clear, if somewhat

## Outline and Questions on William H. Harrison

### I. Early Life

- (1) Birth and parentage
- (2) Education
- (3) Choice of military career

### II. Most Active Years

- (1) Early military service
- (2) As secretary of Northwest Territory
- (3) As territorial delegate in Congress
  - (a) Homestead laws
  - (b) Division of the Northwest
- (4) As governor of territory of Indiana
- (5) In the War of 1812
- (6) Political activity
  - (a) Negotiations with Indians
  - (b) As Representative in Congress
  - (c) In state senate
  - (d) As United States Senator
  - (e) As minister to Colombia

### III. Culmination of His Career

- (1) Campaign of 1836
- (2) Election of 1840
- (3) Brief administration
- (4) Death

### Questions

When was "Tippecanoe and Tyler too" a rallying cry, and what did it mean?

How long was Harrison's administration? What other Presidents have died in office?

How did Indiana differ in his day from Indiana to-day?

When was a famous battle fought in the dark?

How many times did Harrison run for President?

Did he win his chief military fame during a great war?

What territory did he gain for the country by his treaties with the Indians?

What power was conferred upon him which was wider than any man before him except Washington had enjoyed?

What part did "log cabin and hard cider" play in electing a President?

What other members of Harrison's family have been famous?

Who was "the Prophet," and what part did he play in Harrison's history?

Who sent the message, "We have met the enemy and they are ours," and to whom did he send it?

Under what famous Revolutionary general did Harrison first serve?

How did Harrison once prove his great courage and coolness?

What was there remarkable about Harrison's Cabinet?

Are there other Presidents whose terms were their "least important periods"?

colorless, political record made him the most available candidate of the Whigs in 1840. Clay was the real leader of the Whigs, but as a Mason he was opposed by a large element in his party, and as an advocate of a protective tariff, he could not win the support of the South. So the choice of the Whigs fell on Harrison.

The Whigs very wisely maneuvered to place the personality of their candidate in the foreground. They adopted no platform, and the only issue was whether or not the Jackson-Van Buren "machine" should remain in power. Even among the Democrats there was much discontent, for the financial policy of Jackson and Van Buren was regarded as the cause of the panic of 1837 and the following business depression. To attract discontented Democrats, the Whigs nominated for Vice-President John Tyler of Virginia, formerly a well-known anti-Jackson Democrat. The campaign was the most exciting which the United States had seen up to that time. "Tippecanoe and Tyler too" was the cry of the Whigs, and it was to his military record that Harrison's election was due. The election is often called "the log-cabin and hard-cider campaign." One end of Harrison's house at North Bend was an old log cabin, long since covered with clapboards. A campaign biography said that Harrison's table, "instead of being covered with exciting wines, is well supplied with the best cider." At first this simplicity received the jeers of the Democrats, but the Whigs eagerly seized the opportunity to make the democracy of their candidate a feature of the canvass. Whenever a Whig orator appeared, there were sure to be miniature log cabins and barrels of excellent hard cider.

Harrison received 234 electoral votes to sixty for Van Buren.

The President-elect was no longer young, and, worn out by the excitement of the campaign, fell a victim to pneumonia before he had time to prove ability in his new post. He was succeeded by Vice-President Tyler. E.D.F.

**Anna Symmes Harrison** (1775-1864), a President's wife for one month, whose place as mistress of the White House was taken by her daughter-in-law, Mrs. Jane Irwin Harrison. When her husband was inaugurated, her poor health made it necessary to delay her journey from



Photo: U & U

ANNA SYMMES HARRISON

their Ohio home; and on April 4, 1841, came the news of her husband's death in Washington.

Anna Symmes came to Ohio as a young girl, and it was in the home of her father, Judge John Symmes, at North Bend, that she married Captain Harrison, then in command of a fort on the present site of Cincinnati. With the exception of her years in the old French town of Vincennes, in Indiana Territory, she spent most of her life close to her girlhood home in Ohio. The trials of a soldier's wife were hers, the long separations and the responsibility of rearing her ten children. At her home in North Bend, within thirty years, she suffered the loss of eight of her children and ten grandchildren. She preferred retirement for herself, and did not look forward to being mistress of the White House. She survived her husband more than twenty years, and died at the home of her son, J. Scott Harrison, the father of the Benjamin Harrison who became the twenty-third President.

**Related Subjects.** The reader who desires additional information respecting matters connected with this President is referred in these volumes to the following articles:

|                     |             |
|---------------------|-------------|
| Civil Service       | Tecumseh    |
| Homestead Laws      | Tyler, John |
| Northwest Territory | War of 1812 |

**HARRISON ACT.** See COCAINE; OPIUM.

**HARROD, JAMES.** See KENTUCKY (History).

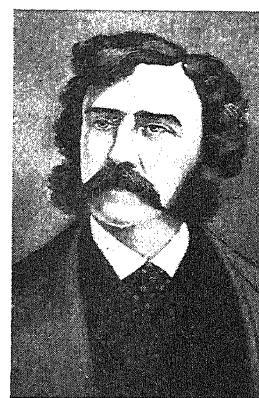
**HART**, a mature stag. See DEER.

**HART, ALBERT BUSHNELL** (1854- ), an American historian and educator who has made his influence felt throughout the United States in connection with modern methods of studying history; that is, by investigating original sources. He was born at Clarksville, Pa., prepared for college at Cleveland, O., and in 1880 was graduated from Harvard University. Three years later, he received a degree at Freiburg University, Germany, and on his return to America became instructor in American history at Harvard. Various promotions followed, until, in 1910, he was made professor of government in the university. He enjoys high rank among modern American historians, and has served as president of the American Historical Association and of the American Political Science Association.

**Historical Contributions.** His work as an author and editor is notable. From 1894 to 1902 he was joint editor of the *Harvard Graduate's Magazine*, and from 1895 to 1900 was one of the editors of the *American Historical Review*. He has also edited several series on American history and government, and was joint editor of the *Cyclopaedia of American Government* (1910-1914). His numerous books on historical subjects include *Actual Government*, *Formation of the*

*Union*, *The War in Europe*, *The Monroe Doctrine*, *An Interpretation*, *New American History*, *School History of the United States*, *America at War*, *Causes of the War*, and *Commonwealth History of Massachusetts*. The "Americanism" of his school history (published in 1917) was questioned in 1923, and it was removed from the schools of New York State.

**HARTE, hahrt, [FRANCIS] BRET** (1839-1902), an American poet and short-story writer, usually known as BRET HARTE, whose picturesque and realistic tales of life in the mining camps of California are among the best short stories in American literature. He was born in Albany, N. Y., but his father died when he was young, and at the age of fifteen, he went to California with his mother. There he drifted with the human tide, trying, at different times, to make his way as a miner, school teacher, express messenger, and typesetter. Meantime, the varied



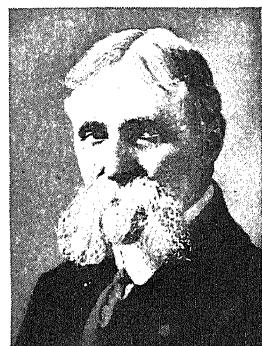
BRET HARTE

life and scenery of the California plains and mountains were making impressions that he later reproduced with wonderful fidelity; he was becoming familiar with the types of character that live in his pages.

In 1857 Harte was employed as a typesetter by the *Golden Era*, a weekly newspaper of San Francisco, and for it he began to write sketches that eventually won him the position of assistant editor. In 1864 he joined the staff of the *Weekly Californian*, in which appeared the clever parodies on the styles of various authors that were later published as *Condensed Novels*. At the same time he became secretary of the United States Branch Mint at San Francisco, an office which he held until 1870.

In 1871, after serving for a few months as professor of recent literature in the University of California, Harte went to New York to continue his literary work. For several years after 1878, he was in the consular service, holding appointments at Crefeld, Germany, and at Glasgow, Scotland. From 1885 until his death, he lived in England, where, from time to time, he issued volumes of tales which showed that the vivid impressions of his early life in California were undimmed by time. The last of these, *Under the Redwoods*, was published in 1901, the year before his death.

**His Literary Career.** It was in 1868, when he became editor of the newly founded *Overland Monthly*, that Bret Harte won national fame by publishing *The Luck of Roaring Camp*, the first of those Western



ALBERT BUSHNELL HART  
Photo: Brown Bros.

tales that best represent his genius. It was followed by *The Outcasts of Poker Flat*, Tennessee's Partner, *Miggles*, An Idyl of Red Gulch, and others, stories in which the grandeur of California scenery serves as a background for narratives of the wild and often dissolute life of the "Forty-niners," as the early gold-seekers were called.

Adventurers, gamblers, wrecks of humanity of both sexes, move across his pages, forming a picturesque and vivid gallery of human portraits. These are presented without apology or explanation; there are no unnecessary comments or descriptions, for Harte's characters reveal themselves wholly in their words and actions. Often the sorriest specimen of humanity is shown to possess the divine spark of heroism, as in *The Outcasts of Poker Flat*, where a wretched woman, driven out from the town, starves to death that her snow-bound companions may have her portion of food. From a literary standpoint, these tales are examples of the highest art.

The author's most popular poem, *Plain Language from Truthful James*, also known as *The Heathen Chinee*, was published in 1870. This often-quoted poem, of which the first stanza appears below, has a breezy humor, vivacity, and original touch characteristic of his best verse:

Which I wish to remark,  
And my language is plain,  
That for ways that are dark  
And for tricks that are vain,  
The heathen Chinee is peculiar,  
Which the same I would rise to explain.

**HARTEBEEST**, the name of a class of large African antelopes of somewhat ungainly appearance. Their distinguishing characteristics are a long, narrow head, thin neck, back sloping downward to the narrow haunches, cowlike tail, and ringed, lyre-shaped horns, which are present in both sexes. Though they run in a lumbering fashion, these antelopes are swift-footed and keen. There are numerous species with various names, distinguished by characteristic markings. A reddish tinge to the coat is very common, and on some of the African plains is a very satisfactory form of protective coloration. The common hartebeest of South Africa, once found in large herds as far as the Zambezi River, is now seen only in the remote interior, having been

ruthlessly killed for its flesh and hide. It may be known by its grayish-brown coat, black face markings, and heavily ringed horns curving back sharply at the tips. See ANTELOPE.

W.N.H.

**Scientific Name.** The hartebeests belong to the family *Bovidae*. The common species is *Bubalis caama*.

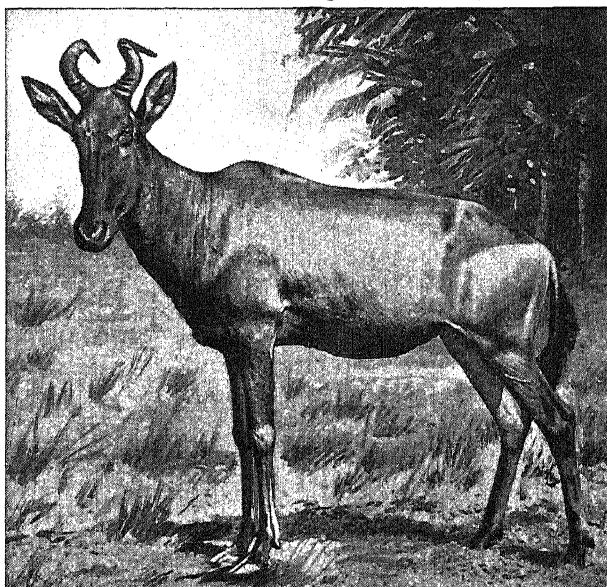
**HARTFORD**, CONN., the state capital and the county seat of Hartford County, is located on the west bank of the Connecticut River at the head of river navigation, fifty miles from Long Island Sound, and midway between Boston and New York. Across the Connecticut River, connecting Hartford and East Hartford, is a nine-span granite bridge, one of the finest of its kind. The city proper has a population of 172,300 (1928 estimate of the Federal Bureau). Adjoining it are the suburbs of East Hartford and West Hartford, the three having a combined population of over 200,000.

**General Description.** The State Capitol, situated in Bushnell Park, in the center of the city, contains many historic treasures, regimental flags of the War of Secession, bronze statues, including one of Nathan Hale, and oil paintings of statesmen; among the latter is one of Washington by Gilbert Stuart. The Morgan Memorial is a gift to the city by J. P. Morgan in memory of his father, Junius Spencer Morgan, for many years a merchant here; it includes in its collections choice tapestries and other works of art.

Hartford has seven parks and several public squares, embracing over 2,700 acres. The parks are equipped with playgrounds, tennis courts, golf courses, baseball diamonds, picnic groves, bowling greens, and other amusement spaces. One of the finest municipal rose gardens in the country is to be found in Elizabeth Park.

Other places of interest are the homes of Samuel L. Clemens (Mark Twain), Harriet Beecher Stowe, and Charles Dudley Warner.

**Transportation.** Hartford is served by the New York, New Haven & Hartford Railroad; by a daily boat from Hartford to New York; daily truck service



THE HARTEBEEST

Photo: Metze, Mashonland, Africa





**Harun-Al-Rashid.** In the well-known tale, the Caliph exchanges royal vestments for the filthy rags of a fisherman, whom he catches plying his trade in a stream of the palace gardens. This story portrays the character and liberal disposition of the ruler.

to Springfield and Boston, to Greater New York, and all Southern New England cities; daily air service to Boston and New York; and bus service to all Southern New England cities, Boston, and New York.

**Industries.** There are over forty insurance companies controlled from Hartford offices. Approximately 16,000 people are employed in this particular field, the pay roll of which amounts to \$22,000,000 annually. Thirty thousand skilled and semi-skilled employees are in the manufacturing industry, which requires an annual payroll of \$32,850,000. The yearly value of the industrial products is about \$13,675,000. These include typewriters, airplane engines, brushes, refrigerating machines, electrical appliances, electrical switches, drop forgings and machinists' tools, castings, automobile radiators and parts, chucks, telephone equipment, special machinery, rubber tires and tubes, ball bearings, vacuum cleaners, steam turbines, bookkeeping and statement machines, and automobile chains.

**Education.** Hartford has Trinity College, Saint Thomas's Seminary, Hartford Seminary Foundation, Kingswood School (for boys), Oxford School (for girls), and a Trade School.

**History.** Hartford was settled by the Dutch, who built a fort and called it "The House of Hope." In the spring of 1636, a band of settlers from Newtown (now Cambridge, Mass.), headed by Thomas Hooker, arrived, and named the settlement after Hertford, England. It was the constitution drawn up and adopted by the Hartford colony in 1639 that was used in part as a model, 150 years later, for the national Constitution.

F.G.F.

**HARTFORD CONVENTION**, an American political convention called at the suggestion of several Federalists (see FEDERALIST PARTY) at Hartford, Conn., on December 15, 1814, primarily to discuss the condition of the Eastern states. These had suffered more severely than those south and west in the War of 1812, then in progress. Twenty-six delegates were present from Rhode Island, Connecticut, Massachusetts, and parts of New Hampshire and Vermont. George Cabot, of Massachusetts, was elected president, and Theodore Dwight, of Connecticut, secretary. Secret sessions were held for three weeks. A report to the legislatures of New England was prepared, and seven amendments to the Federal Constitution were recommended, which it was claimed were needed as a defense against foreign nations and for greater independence of the various states. The convention adjourned on January 5, 1815.

The opponents of the Federalists made the secret proceedings a basis for charging that the convention had plotted secession, but the leaders denied there had been such intention. A committee was appointed to confer with the government at Washington; in those days news traveled slowly, and peace had been declared by the Treaty of Ghent, on December 24, 1814, before the committee reached the capital. The convention was a final blow to the Federalist party, which had been very

unpopular, and for many years the term "Hartford Convention Federalist" was one of reproach.

**HARTSHORN**, a term that originally signified the liquid product obtained by the distillation of shavings of horn of the hart, or stag. This product, called *spirit of hartshorn*, or volatile salt of hartshorn, was used in medicine and as a basis for smelling salts for headache, on account of its pungent odor. The active ingredient of the salt of hartshorn of the modern pharmacy is ammonia (which see).

**HARTHACNUT.** See HARDECANUTE.

**HARUN-AL-RASHID**, *hah roon'-ahl-rah-sheed'* (?-809), the fifth of the Abbasside caliphs and a thorough Oriental despot, celebrated in countless songs and stories, but known especially as the central figure in the tales of the *Arabian Nights*. He became caliph, or head of the Moslem state, in 786, speedily suppressed all insurrections, intrusted the administration of affairs to his Grand Vizier Yahya, and made Baghdad, his capital, the resort of the most eminent Mohammedans of the age. Harun loved luxury and pleasure, but was a patron of learning, music, and art. He was much given to traveling about the city after nightfall, in disguise, that he might acquaint himself at first hand with the condition of the people in all walks of life. See ARABIAN NIGHTS.



STATUE OF JOHN HARVARD  
On the grounds of Harvard University.

**HARVARD, JOHN** (1607-1638), an American clergyman, one of the founders of Harvard University, was born in Southwark, London.

He was the son of a poor butcher, but his mother, after the death of his father, gained considerable property through two later marriages. She was able, therefore, to educate him at Cambridge University, where he received both the bachelor's and the master's degrees. In 1637 he emigrated to Charlestown, Mass., to become clergyman for that settlement, but died a year later. He had taken great interest in the plan of the Massachusetts colonists to establish a college at "Newtowne," afterward known as Cambridge, and at his death left for the founding of such a school £400 and his library of 260 volumes. In 1639 the trustees of the college, in recognition of what the gift meant, gave his name to the institution. In 1828 a monument to his memory was erected in the graveyard at Charlestown, and Edward Everett delivered an eloquent address telling the details of the man's brief life. Many pamphlets and sketches about him have been published, but perhaps the most thorough accounts are found in Rendle's *John Harvard* and Thayer's *History of Middlesex County*.

**HARVARD CLASSICS.** See **ELIOT, CHARLES WILLIAM.**

**HARVARD COLLEGE OBSERVATORY.** See **OBSERVATORY.**

**HARVARD UNIVERSITY**, the oldest institution for higher education in America, was established in 1636, only six years after the foundation of the colony of Massachusetts Bay and sixteen years after the landing of the Pilgrims. From its earliest days, it has maintained a leadership and prestige among educational institutions second to none. From it have come many of the impulses which have profoundly altered the character of higher education; probably the most important of these changes was the introduction of the elective system.

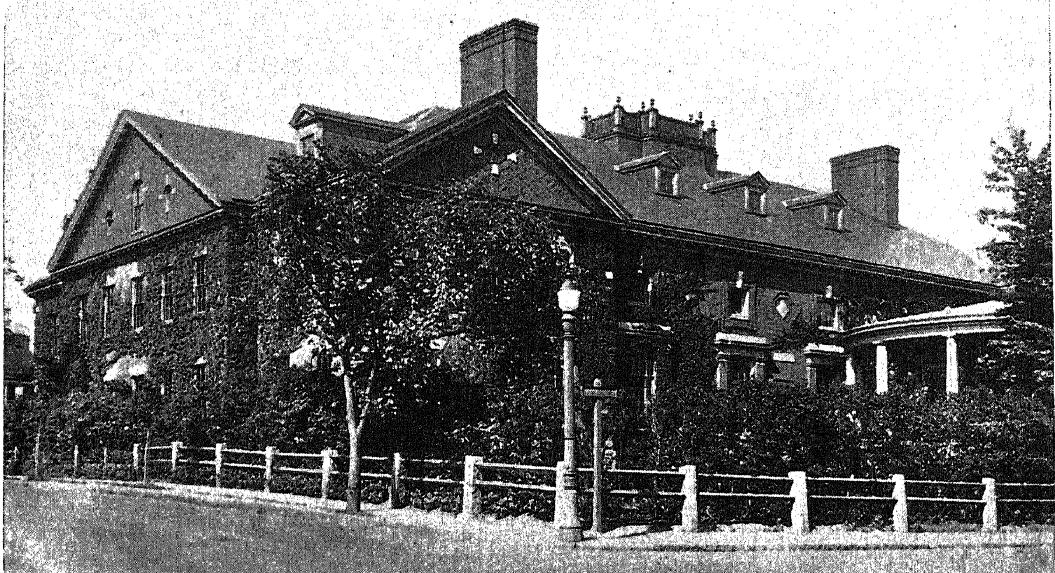
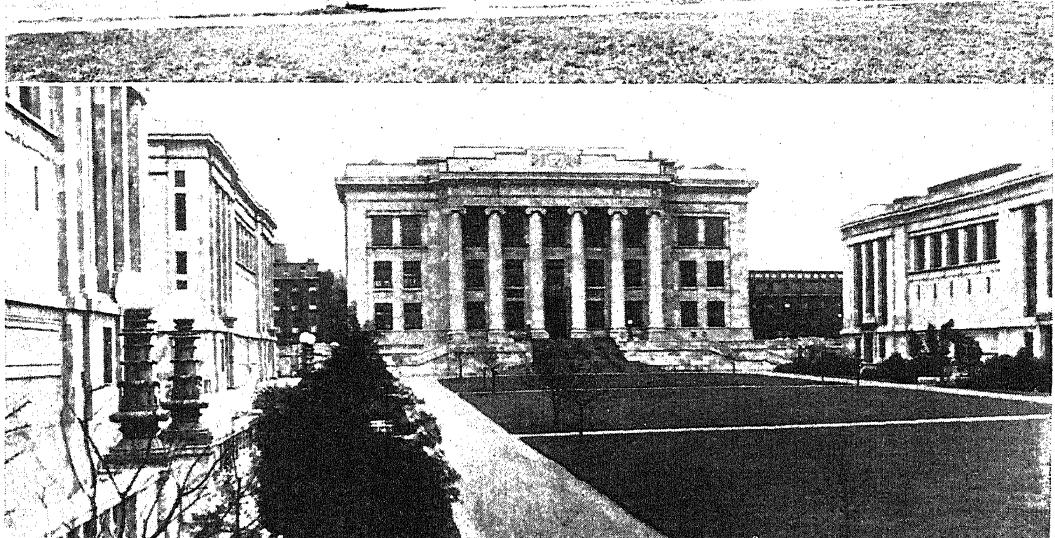
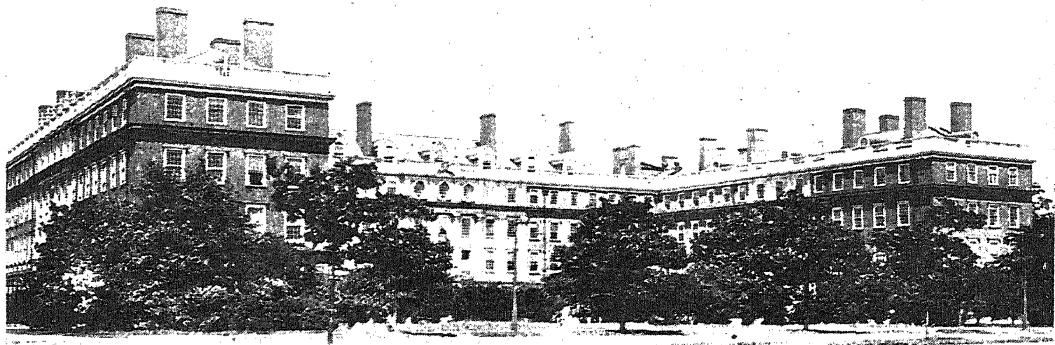
Not alone in education have Harvard men been eminent and influential. From the days of Increase Mather to the present, Harvard men have been leaders in all fields, but particularly in literature and politics. Three Presidents of the United States—John Adams, John Quincy Adams, and Theodore Roosevelt—were Harvard graduates, and George Washington received an honorary degree from Harvard in 1776. Among other well-known names on the roll of graduates are Cotton Mather, Theodore Parker, Ralph Waldo Emerson, Henry D. Thoreau, James Russell Lowell, Oliver Wendell Holmes, Oliver Wendell Holmes, Jr., George Bancroft, William H. Prescott, John Lothrop Motley, Francis Parkman, Charles Sumner, Edward Everett, Wendell Phillips, and Joseph Story.

**Growth of the University.** It was on October 28, 1636, that the General Court or assembly of the colony of Massachusetts Bay voted £400 (\$2,000) for "a schoale or colledge" to be established at Newtowne. Two years later the name

of the town was changed to Cambridge, in honor of the English university, at which about sixty of the leading men of the colony had been educated. Among the number was Rev. John Harvard, a Puritan minister; when he died, in 1638, he left his library of 260 volumes and half of his estate to the new college. This bequest, amounting to £400 (\$2,000) was a princely one for those times, and it was immediately decided to name the institution in his honor. The first class, comprising nine students, was graduated in 1642.

For many years the college grew slowly but steadily, in spite of internal dissensions. Almost from the beginning, there was conflict between the two governing bodies of the university, the corporation and the board of overseers. The corporation, comprising the president, the treasurer, and five fellows, was charged with the administration of the college, but many of its acts were subject to the approval of the overseers. The corporation for many years was inclined to be liberal, particularly in matters of religion, while the overseers, half of whom were Congregational ministers and the other half state officials or laymen chosen by the legislature, were conservative. For years there was a triangular struggle between the colonial or state officials and the strict and the liberal elements among the Congregationalists. During the first half of the nineteenth century, the college was the chief stronghold of the Unitarians, and it was not until 1851 that the charter was amended to include no reference to control by any Church. In 1865 the state surrendered its partial control of the university by transferring the election of the overseers from the state legislature to the alumini.

When Charles William Eliot became president, in 1869, the time was ripe for great changes, for the university was free from state and denominational influences. It is noteworthy that Eliot was the first president who was not a minister. In 1869 Harvard included the *college*, or academic department, and several semi-independent professional schools with no fixed standards of admission. The attendance was between 1,000 and 1,100, and the yearly income was less than \$300,000. The elective system had made its appearance in 1825, but the few elective courses offered were not popular and were thought to be of little value. The medical school, founded in 1782, and the law school, founded in 1817, were not yet on a secure basis. When Eliot resigned, in 1909, he left a coördinated university, with professional schools open only to college graduates, with an enrollment of over 5,000 students in all of its ten great departments, and an annual income, not including gifts and bequests, of more than \$2,000,000. He had also firmly established the system of elective studies, which, in more



Photos: U & U

**Views at Harvard University.** From top to bottom, Gore Hall, the Medical School, and Harvard Union, the center of undergraduate life of the university.

or less modified form, is now found in almost every college and university in the United States and Canada. In 1869 Harvard was merely a large New England college; to-day it is one of the world's great universities.

The only department of the university whose courses are open to women is the Graduate School of Education, but Radcliffe College (see below) is affiliated with the institution.

**Radcliffe College**, a school of higher education for women, has been officially connected with Harvard University since 1894. It is the outgrowth of the Society for the Collegiate Instruction of Women, which was organized in 1882. The name, adopted by act of the General Court of Massachusetts in 1894, is in honor of Ann Radcliffe, the first woman to give a money endowment to Harvard University. The buildings of the college are located about three blocks from the Harvard campus.

The requirements for admission are the same as those adopted by the university for men, and the courses of study, which are in charge of Harvard professors, are practically identical with those offered by the men's institution. The university museums and libraries are open to the students of Radcliffe.

**Related Subjects.** The reader is referred in these volumes to the articles ELECTIVE STUDIES; HARVARD, JOHN; ELIOT, CHARLES WILLIAM, LOWELL, ABBOT LAWRENCE.

**HARVESTER.** See REAPING MACHINE.

**HARVEST FLY.** See CICADA.

**HARVESTMAN.** See DADDY-LONG-LEGS.

**HARVEST MITE.** See JIGGER.

**HARVEST MOON**, a name given to the full moon that occurs nearest the autumnal equinox, about September 23. It rises about the same time for several successive nights, shining with such a brilliant light that farmers in northern latitudes are able to work in the harvest fields until late at night. The harvest moon is more important to Northern Europe and Canada than to the United States. At this time there is a very small angle between the moon's orbit and the horizon, and the moon rises only a few minutes later each day. This retardation of the moon is reduced almost to nothing in more northerly latitudes, and people there enjoy the benefit of more hours of moonlight. The harvest moon in the southern hemisphere occurs in March, at the vernal equinox. F.B.L.

**In the Arts.** The beauty of the harvest moon has been celebrated in painting and in poetry. Longfellow in his *Harvest Moon* describes it in these words:

It is the Harvest Moon! On gilded vanes  
And roofs of villages, on woodland crests  
And their aerial neighborhoods of nests  
Deserted, on the curtained window-panes  
Of rooms where children sleep, on country lanes  
And harvest fields, its mystic splendor rests.

**HARVEY, GEORGE BRINTON [MCCLELLAN]** (1864-1928), an American journalist who rose to a high post in diplomacy through appointment as ambassador to England by President Harding in 1921. He was born in Peacham,

Vt., and was educated at a local academy. Harvey had a picturesque newspaper career, which, prior to his London appointment, was interrupted but twice after he was eighteen years of age. In 1890-1891 he held office as insurance commissioner of New Jersey, and from 1885 to 1890 was an aid-de-camp on the staff of the New Jersey governor, but this did not interfere with his newspaper work; in 1894 he engaged in the construction of electric railways, and four years later headed a syndicate which secured control of the street-car service in Havana, Cuba.

He will be remembered best as one of the most interesting characters in American journalism, with a record which may be summed up as follows:

Between 1882 and 1891, reporter on the Springfield (Mass.) *Republican*, *New York World*, and *Chicago News*.

Editor of the *New York World* from 1891 to 1893.

Purchased *The North American Review* in 1899, at that time becoming its editor.

Became president of the publishing firm of Harper & Brothers in 1900, and from 1902 to 1915 edited *Harper's Weekly*; in the latter year he retired from the organization.

Purchased the *Metropolitan Magazine* in 1903.

In 1918 he established *The North American Review War Weekly*, later changing the name to *Harvey's Weekly*; it was discontinued at the close of the war.

Harvey is said to have been the first to suggest (in 1906) the name of Woodrow Wilson for President of the United States. He heartily supported the Wilson candidacy, but soon an estrangement occurred, and after Wilson's election, the Harvey influence was arrayed against the President.

As ambassador to England, he endeavored to increase the concord between the two nations, but his critics at home denounced him as being erratic, spectacular, and pro-British, and he resigned the office in 1923.

**HARVEY, WILLIAM** (1578-1657), an English physician who, by his discovery of the circulation of the blood, laid the foundation of modern medicine. This epoch-making discovery, which inaugurated an era of experiment in biology, is more remarkable when one considers that, without the aid of a microscope, Harvey reached conclusions that have stood the test of time. From 1628 on, his time was spent in defending and expounding his doctrine of circulation, for the professors of anatomy of his day disbelieved his theories; and it was not until 1827 that the full truth of his conclusions was substantiated.

He was born at Folkestone, and took his medical degree at the University of Padua. Returning to London in 1602, he became physician of Saint Bartholomew's Hospital, and then lecturer at the College of Physicians there. He was later appointed physician to

James I and to Charles I. His treatise, *Exercitatio Anatomica de Motu Cordis et Sanguinis in Animalibus* (On the Movement of the Heart and Blood in Animals), which expressed his views on circulation, is the greatest single essay on a biological or medical subject ever given to the world. See PHYSIOLOGY; BLOOD (Circulation of the Blood).

**HARZ**, *hahrtz*, MOUNTAINS, a range of mountains in Germany, averaging 1,000 feet in elevation, and extending for a distance of sixty miles through Prussia, Brunswick, and Anhalt, between the rivers Saale and Leine. The highest peak, the Brocken, rising to a height of 3,747 feet, is famous for the shadows of spectators that are thrown by the sun upon the morning and evening mists. The lower slopes are covered with valuable timber, including oak, pine, and beech, but the mountain tops are quite barren. These hills, principally of granite, are rich in minerals, including silver, copper, iron, and manganese; mines have been worked since the twelfth century and are not yet exhausted. The inhabitants of the Harz Mountain district are skilful in the rearing and training of canaries which are regarded as the finest songsters in the world. The scenery is beautiful, and is popular with tourists. See GERMANY (Physical Features).

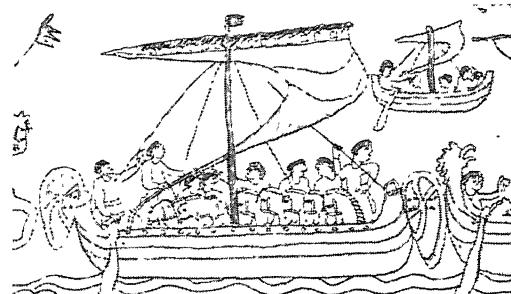
**HASDRUBAL**, *has' droo bal*, the son-in-law of Hamilcar Barca, a Carthaginian general. He accompanied Hamilcar into Spain in 237 B.C., and aided in building up the dominion of Carthage. When his father-in-law died, in 228 B.C., Hasdrubal became the administrator for the new empire, the borders of which he enlarged. He founded a new capital at what now is Cartagena, Spain. In 221 B.C., he was assassinated by a Celtic slave. There were other Carthaginian generals by the name of Hasdrubal, one of them being Hamilcar's own son, but none was as famous as his son-in-law. See PUNIC WARS; HAMILCAR BARCA.

**HASHISH**, *hash' eesh*, a narcotic preparation much used in the Orient to produce a form of intoxication accompanied by dreams, delusions, drowsiness, and sleep. It is made from the tops and tender parts of Indian hemp, the active principle of which is extracted by boiling the plant parts in a mixture of water and butter or oil. The drug is prepared as a beverage, and for smoking and chewing, and in India each of these preparations has a special name. Opium, henbane, musk, ambergris, and other drugs are added to the mixture. A medicine called *cannabis*, obtained from a bushy variety of hemp, is used in regular medicinal practice as a sedative.

**HASHISHIN**, the name of a band of medieval assassins. See ASSASSINATION.

**HASMOENEANS**, *haz mo ne' anz*, original name of the Maccabees (which see).

**HASTINGS**, BATTLE OF, regarded as one of the fifteen decisive conflicts of history, took place on October 14, 1066, at Senlac,



William's Fleet Crossing the Channel



The Battle of Hastings



Flight of the English

#### HISTORY IN TAPESTRY

The three scenes represent incidents connected with the Battle of Hastings.

near Hastings, between the English under King Harold and the Norman invaders under William of Normandy. Harold had been crowned king, but William laid claim to the throne, and declared that Harold had promised to support his ambition. In this battle, which was the only one fought to bring about the establishment of Norman rule in England, Harold was slain and the English were completely defeated. Thereafter the victor was popularly known as William the Conqueror, and by historians as William I.

**Related Subjects.** The reader will find added material of value in these volumes in the following articles:

Fifteen Decisive Battles  
Harold (II, England)

Normandy  
William (I, The Conqueror)

**HASTINGS**, NEB. See NEBRASKA (back of map).



SOME STYLES IN HATS WHICH SELDOM CHANGE

(1) Headdress worn in parts of India. (2) Straw hat with cone-shaped crown, worn over a turban; the hat of Shan girls in Burma. (3) Straw hat worn by men in Burma. (4) Turbanlike hat made of strips of cloth, worn by women in parts of Indo-China. (5) A straw cap bound by a metal band constitutes the head covering of the Igorot in the Philippines who has not yet come under the influence of the Americans. (6) Headress of Swedish girl. (7) The Siamese hill women wear this style of headdress.

**HASTINGS, WARREN** (1732-1818), a British soldier and statesman, and first Governor-General of India. At the age of eighteen, he received an appointment in the East India Company's service and went to Bengal. In 1757 he joined Clive and served with distinction as a volunteer in his campaign. In 1761 he became a member of the Bengal council and removed to Calcutta, but returned to England in 1764. Five years later, he was sent back to India on government affairs, became a member of the council at Madras, and three years later was made president of the supreme council of Bengal. He was made Governor-General of India in 1774, holding this position for eleven years. He then resigned and returned to England.

Hastings was charged with maladministration and the receiving of bribes from the East India Company, and was impeached as a result of Burke's efforts. His trial, one of the most famous in history, began in 1788 and lasted seven years. The most eloquent English advocates, Burke, Fox, and Sheridan, were arrayed against him, but the verdict freed him. The following year, 1796, the East India Company settled on him a large annuity.

**Related Subjects.** The reader is referred in these volumes to the following articles:

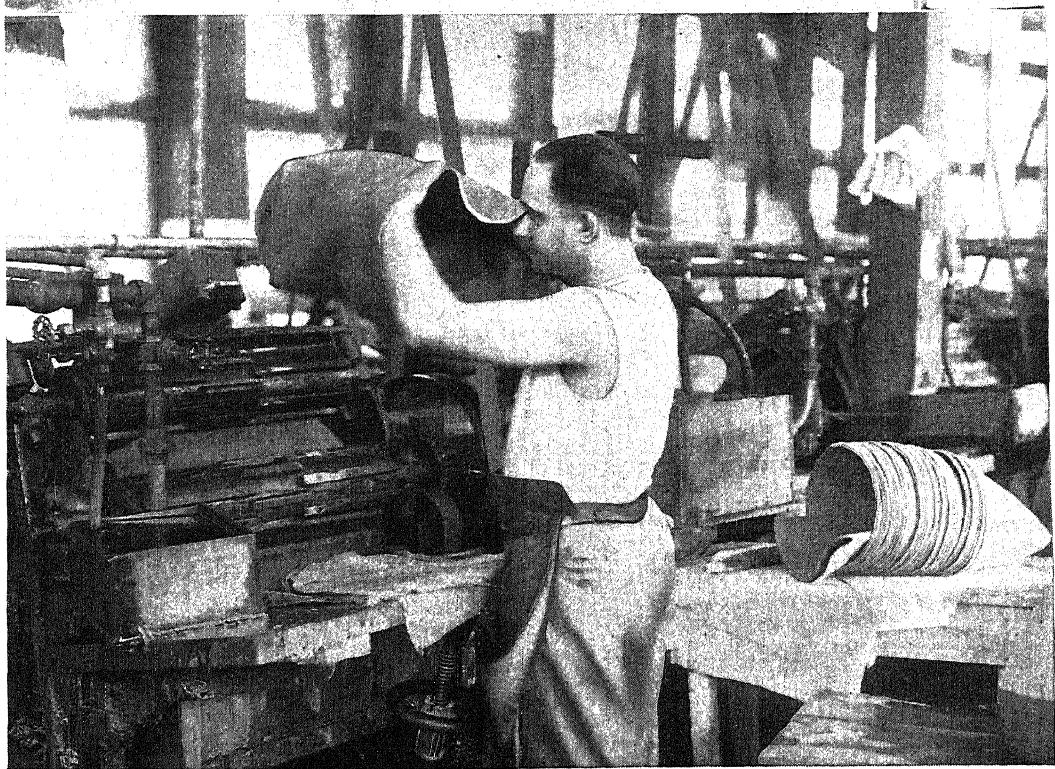
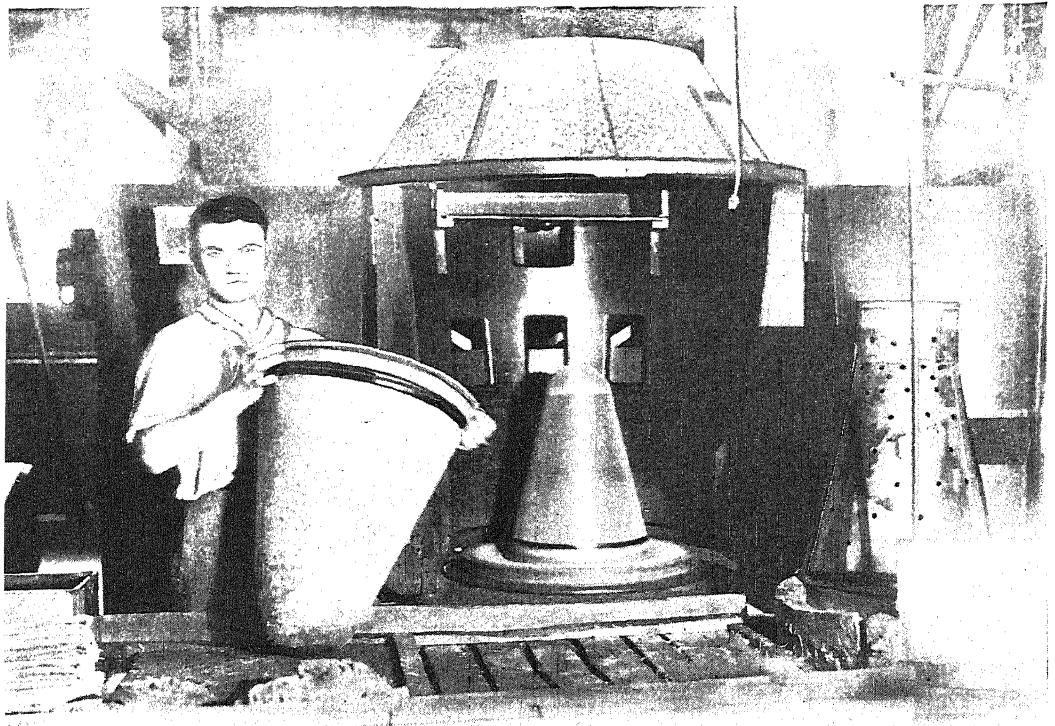
|                                     |                    |
|-------------------------------------|--------------------|
| Burke, Edmund                       | East India Company |
| Clive, Robert                       | Fox, Charles       |
| India (History: The British Empire) |                    |

**HASTINGS COLLEGE.** See NEBRASKA (Education).

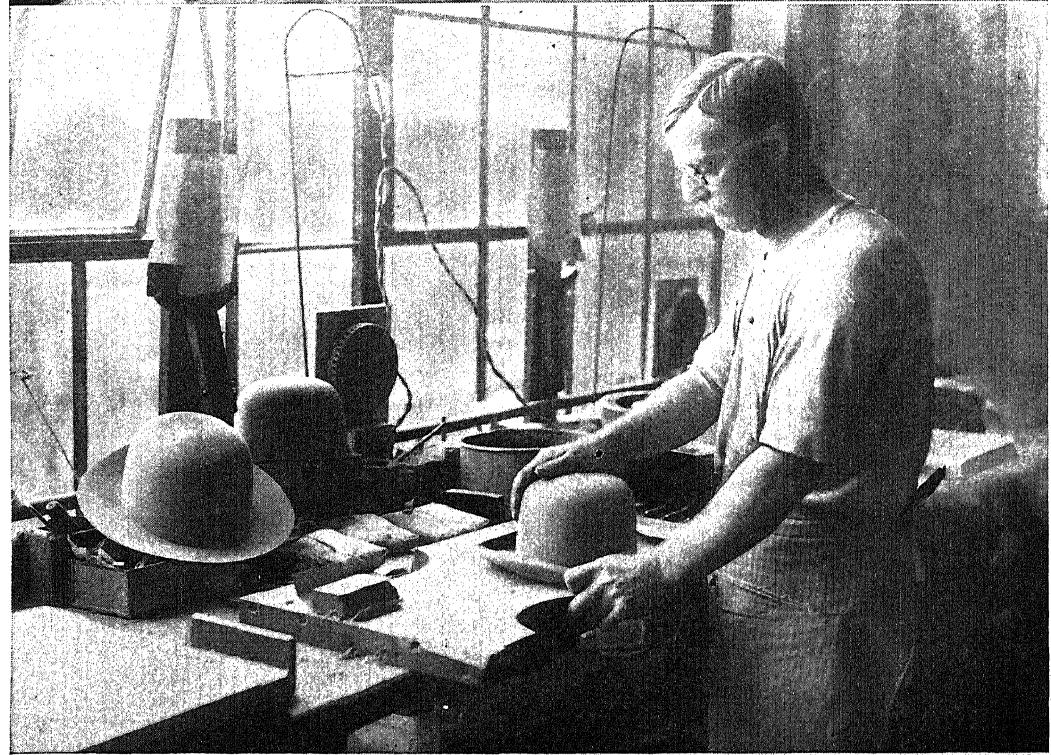
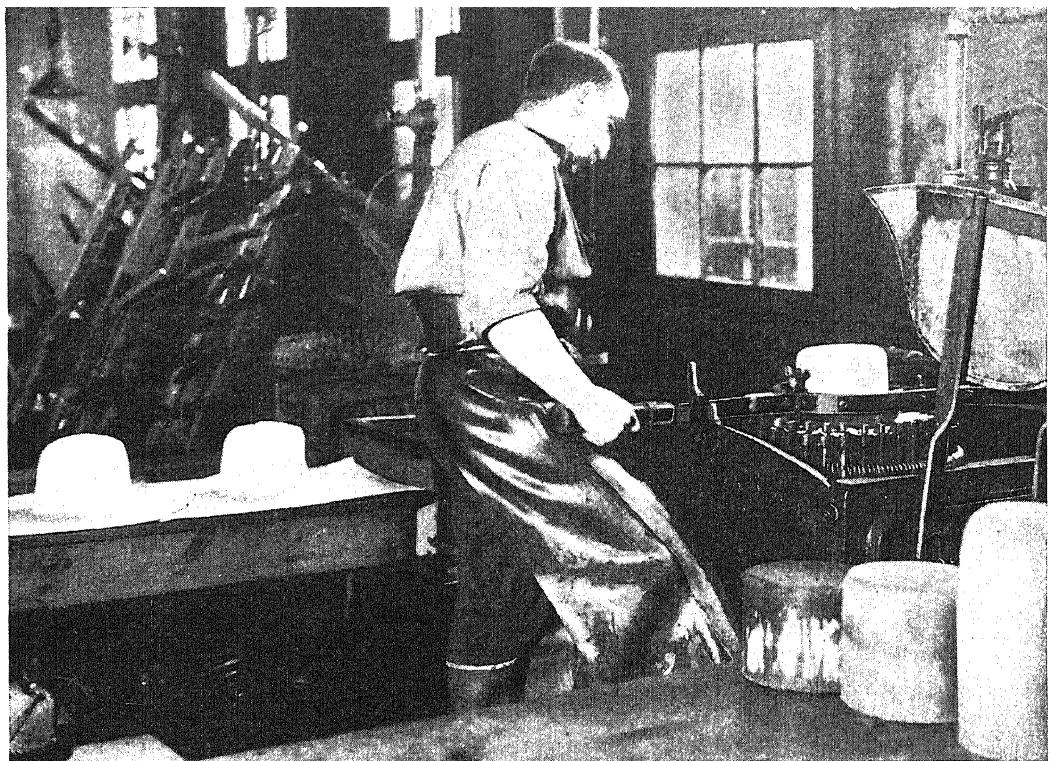
**HAT.** Although it has been customary from the earliest days for men and women to wear head coverings of some kind, the art of hat-making is comparatively new. Until about the beginning of the fifteenth century, soft caps formed the usual headwear in Europe, except when helmets or military headdresses were worn.

The art of felting was introduced into Germany probably from the East, and flourished there for nearly a century before it reached England. As soon as the art was established, about 1510, caps became the headdress of the poorer classes only, while hats were regarded as the exclusive property of the aristocracy. Wool was the first material employed in making felt hats; the fine, soft fur of the beaver came into use when the great fur country of North America was entered. So extensively was beaver fur used that hats were commonly called *beavers*.

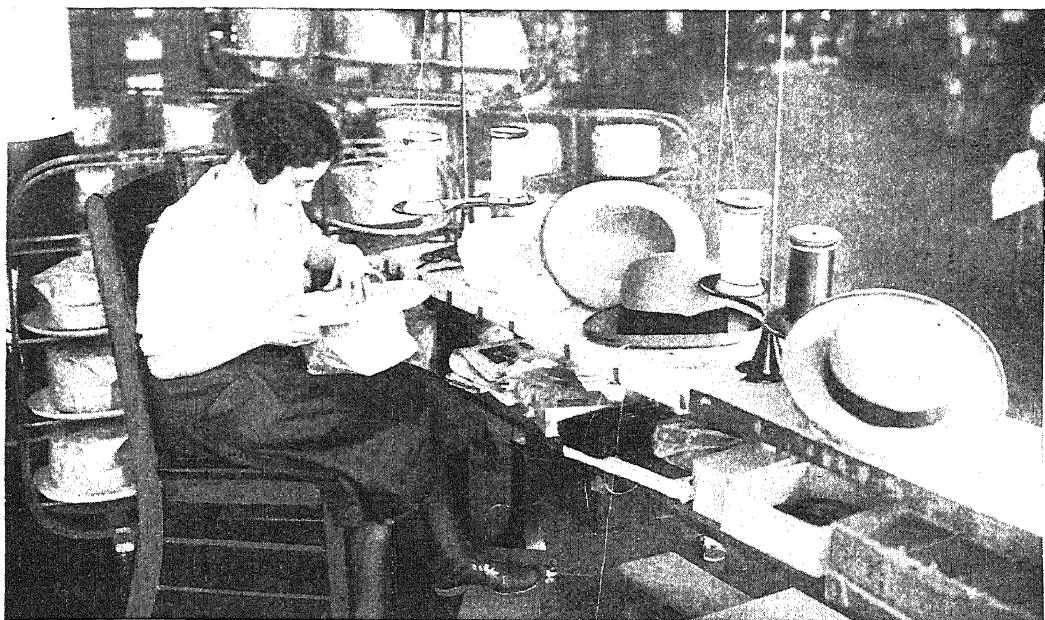
**Felt Hats.** Beaver fur is now so scarce that it is used very little in hat-making. Its place has been taken by rabbit, hare, and muskrat fur, and waste cuttings. All the processes which were formerly performed by hand are now more quickly and economically accomplished by machinery. Fur to be used in felting is first soaked in a solution of nitrate of mercury, after which it is shaved from the skin. The pulpy mass of fur is next pressed into sheets or pieces of the required thickness, which are then molded into hats. For years the most common form of felt hat was what is called a *derby* in America and a *bowler* in England. The derby was introduced as a fashionable novelty in America in 1874. To make this type of hat, a piece of the pressed felt, which has been previously shrunk by heat and dyed, is placed over a mold the shape and size of the hat. Sufficient margin of material is allowed for the brim, which is turned and shaped by a mold slipped over the crown. It is then stiffened with a solution of shellac in alcohol. The hat is then removed to another block, on which it receives finishing touches; it is sandpapered to remove any unevenness of surface, the sweatband, lining, and trimmings are attached, and after a final shaping and testing on the block, it is ready for the market. The soft felt hat, made similarly except that



**The Making of a Hat.** (r) The first step in the process is to form the hat, as shown in the first illustration.  
The second step is to shrink the felt form, as shown below.



The Making of a Hat. (2) The third and fourth steps include blocking and shaping, after which finishing occurs, excepting the trimming; that final process is shown in the next illustration.



**The Making of a Hat. (3)** The young lady is placing the band on the outside, and on the inside is putting the sweatband and the silk lining, provided the latter is required by the specifications.

the stiffening process is omitted, is popular today among men and women alike.

**Silk Hats.** The first silk hats were made in Florence, Italy, about 1760. They are tall and stiff, flat on the top, rounded like a stove-pipe, and have a satiny luster. In their manufacture, silk plush takes the place of beaver fur, which has become too scarce and costly for the purpose. The body is now made of calico, stiffened with shellac, the plush being shaped on a block and cemented to the frame of the hat. The brim is made of two or three thicknesses of stiffened calico. The plush is brushed and ironed until it adheres to the frame without creases, the trimmings are added, and the hat is ready for use. The machinery used in making silk and derby hats is of American origin.

**Straw Hats.** The straw used in modern hats is chiefly grown in Italy, Japan, and China, and is exported from those countries in braids which are afterward wound into the required shapes. Machinery is used for sewing the braids, and hydraulic presses are usually employed to fix the shapes. Sizing is used to stiffen the straw, which accounts for the sticky feeling of a straw hat dampened by rain.

**Hats of the World.** In civilized countries, hats vary greatly in shape, size, and color, but the materials remain the same year after year. Women's hats, made of straw, felt, fur, or cloth, are trimmed in many ways. Fur, feathers, ribbons, and flowers are the principal trimmings, varied to meet the requirements of the prevailing mode. Audubon societies have made

it uncommon for women to wear any part of a bird, other than feathers, upon their hats (see AUDUBON SOCIETY). In less civilized countries, or for peasant costumes, fashion decrees fewer changes; a certain style of head-dress, once adopted, is held for generations. The women of Sikkim, India, wear an extravagant, turban-like erection decorated with gold ornaments and precious stones. The Shan girls, and many of the coolies of Indo-China, wear a huge hat of plaited straw, with a brim like an umbrella and a big cone on the top. The Burmese are partial to a somewhat similarly shaped hat, although the women usually wear a cloth hat without a brim, shaped like a large fez. The formerly savage Igorot of the Philippines wears a small "pillbox," made of straw and bound by a metal band. The head-dress of the Swedish peasant girls is simply and attractively made of cloth, the color depending on individual taste. In shape it resembles the hood formerly worn on cloaks. The Siamese hill women go to extremes, and wear a huge structure with an erection of lace on a light wooden framework. The headdress of many natives of Africa consists merely of feathers, and the Indians of North America usually wore elaborate coverings of skins decorated with gayly colored feathers. It is probable that all head coverings originated in the desire for ornamentation rather than protection.

**Hat Customs.** There are many curious customs in connection with the wearing of hats. Spanish grandees had the privilege of keeping

them on their heads when in the presence of royalty, and this right was granted to certain noblemen in England. English peers may sit in a court of justice with hat on, and among orthodox Jews, men wear a hat or cap when in the house and the synagogue, as a mark of respect to the women. Among Catholics and Episcopalians, women are not permitted in church without a hat, unless the head is covered by a mantle or handkerchief. During the Wellington and Peel administration, a white hat was an emblem of the radical reformers. In the eighteenth century, in Sweden, the party favorable to France wore a French *chapeau*; those in favor of Russia, a Russian cap. One's partisan affiliations have often been indicated by the color or shape of the hat worn. See LIBERTY CAP.

**HATCH ACT.** See AGRICULTURAL EXPERIMENT STATIONS.

**HATHAWAY, ANNE.** See STRATFORD-ON-AVON; SHAKESPEARE, WILLIAM.

**HATHOR, hah' thawr.** See ATHOR.

**HATTERAS, hat' ur as**, a cape on Hatteras Island, on the coast of North Carolina, is the projecting point of a long reef of sand, which storms and shoals make dangerous to navigation. A lighthouse over 190 feet high has a light that flashes every ten seconds, and three-quarters of a mile south there is another steady white light thirty-five feet above the sea. The Gulf Stream flows only twenty miles east of the cape, and, in avoiding it, southbound vessels are occasionally driven too near the coast and founder on the treacherous shoals.

**HATTIESBURG, hat' iz burg**, Miss. See MISSISSIPPI (back of map).

**HATTO**, a bishop concerned with an interesting legend. See MOUSE TOWER.

**HAUPTMANN, houpt' mahn**, GERHART (1862- ), popularly considered the greatest German playwright since Goethe. In 1912



Photo: Brown Bros.

HAUPTMANN

(\$37,000) was conferred upon him for his encouragement of idealism in literature. He is the priest of individualism. "Live thine own life!" is his belief. His dramas depict in a natural manner the maladies of his age and the actions and struggles of the people in everyday life, without offering a theory for the future. Although much of his work seems hard and relentless, underneath is sounded a note of pity for man's weaknesses as the author sees them.

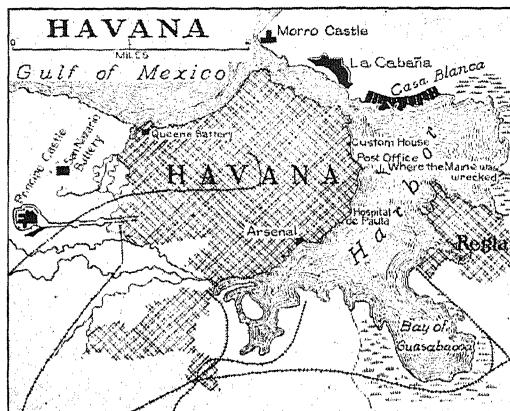
**Principal Works.** *The Sunken Bell*, *The Weavers*, and *Before Sunrise* are among his best plays. He is the author of a volume of poems, *Springtide*, and a book of *Travel Sketches*. His later writings comprise *Das Bogen des Odysseus*; *Parsival*; *Der Ketzer von Soana*; *Indipohdi*; *Anna*, a rural epic; *Phantom*, memoirs of a convict; *Peter Brauer*; and *Kaiser Maxens Brautfahrt*. Many of his lectures have been published.

**HAUSAS, hou' sahs**, a negroid race. See NIGERIA.

**HAUTBOY, ho' boi.** See OBOE.

**HAUY, ah we'**, VALENTIN. See BLINDNESS (Education of the Blind).

**HAVANA, hah van' ah**, OR **HABANA, hah bah' nah**. There is much to interest the visitor in this old-modern city. The original town, which was surrounded by a wall in the early seventeenth century, still reveals picturesque landmarks of the Spanish colonial period. Here are located the governor's palace



MAP OF HAVANA

and the cathedral, both of which are typical of the era of their construction, the early eighteenth century. Just beyond the old boundary line is the modern, well-designed city, with broad streets, beautiful promenades and drives, and picturesque parks, or *plazas*. The houses are low and are built in Spanish style, around central courts which often are bowers of tropical beauty. The walls and roofs are sometimes brightly colored, and instead of windows, there are fancy wood or iron grills.

Havana is the capital and metropolis of the republic of Cuba, and the most important city in the West Indies. Its population increased from 363,000 in 1910 to over 538,000 in 1924. It is but ninety miles distant, almost due south, from the city of Key West, Fla., which is connected by rail with the mainland of that state. The harbor, one of the safest in the world, is entered by a narrow channel between Morro Castle, on the east, and the Castillo de la Punta, on the west. For generations Havana has been visited in the winter season

by tourists from North American lands, and there are a large number of excellent hotels, wealthy clubs, and luxurious theaters in the city. Among the educational institutions are the University of Havana, with an attendance of some 4,000 students, the Jesuit College de Belen (Bethlehem), a normal school, a library and museum, and numerous minor schools.

Alameda de Paula, along the bay, is a popular promenade. Pasco de Martí, formerly the Prado, is a beautiful boulevard ending in Colon Park, the largest in the city.

**Industries.** Cigar and cigarette factories, the largest in the world, are the principal industrial establishments of the city. One of them produces 2,000,000 cigarettes daily. Boxes and barrels, wagons, carriages, and machinery are manufactured to some extent. As the chief port of the island, Havana handles a large part of Cuba's commerce. Cigars, tobacco, and sugar are the chief exports, and the imports consist principally of foodstuffs and cotton. The lighterage interests of Havana are powerful, and through the absence of wharves, those who make a business of removing the cargoes from vessels are prosperous. It has been estimated that bringing a ton of material to shore at Havana costs about as much as to carry it from Liverpool. About half the imports of Havana come from, and nearly two-thirds of the exports go to, the United States.

**History.** It was intended at first that the capital city should be on the south coast of Cuba, but in 1519 the plan was changed and the new city was built on the northern harbor, that it might be more easily reached from Europe. The port chosen, with all its beauty and convenience of location, is unfortunately shallow; and in this day of great ships, it is a serious disadvantage, alike to travelers and to shippers, to make constant use of lighters to effect a landing.

Many times in its long history has Havana suffered from foreign attacks in the wars of Spain; and in the old days of piracy on the Spanish main, it was repeatedly raided by these enemies. Within its harbor occurred, on February 15, 1898, the mysterious catastrophe by which the *Maine*, a visiting vessel of the United States navy, was destroyed, with many of its men (see SPANISH-AMERICAN WAR). In 1926 a hurricane with an intensity of 140 miles an hour wrought great destruction in Havana and vicinity.

**Illustrations.** Three views in the city of Havana will be found in the article CUBA, and to these the reader is referred.

**HAVAS, ah vah', AGENCY.** See ASSOCIATED PRESS.

**HALEOCK, hav' lok, SIR HENRY** (1795-1857), a British soldier, one of the heroes of

the Sepoy Rebellion. He commanded a division of the army invading Persia, in 1857, but on receiving news of the outbreak of the mutiny in India, he went to Calcutta, and quickly organized a force to start from Allahabad to the relief of Cawnpore and Lucknow. After severe fighting, he entered Cawnpore, only to find that the European residents—men, women, and children—had been massacred. After many attempts, his army, worn by sickness and forced marches, reached Lucknow. Here Havelock and General Outram, who had joined him at Cawnpore, were besieged. The British troops, with a few friendly natives, held off the enemy until relieved by Sir Colin Campbell, in November, 1857. The defense and relief of Lucknow stand out among the most brilliant feats of arms ever achieved by British troops. Havelock died seven days after the relief, without knowing that he had been made a baronet. See SEPoy REBELLION.

**HAVERFORD COLLEGE.** See PENNSYLVANIA (Education).

**HAVERHILL, ha' vur il, MASS.**, one of the largest boot-and-shoe manufacturing centers in the world, possesses literary interest, also, as the birthplace of John G. Whittier. It is situated in the "extreme northeastern part of the state, in Essex County, at the head of navigation of the Merrimack River, about eighteen miles from the ocean. Lawrence is nine miles southwest; Lowell, also southwest, is twenty-five miles distant; and Boston is thirty-three miles south. Population, 1928, 49,232 (Federal estimate).

**Transportation.** The city is served by the Boston & Maine Railroad, constructed to this point in 1837, and by interurban and motorbus lines, radiating in all directions.

**Industry.** From its early days, Haverhill has been an industrial city. Its activity in the manufacture of shoes began in 1795, and has a precedence of eighty per cent over all other industries. Haverhill makes more than one-sixth of all women's shoes, more than one-half of all the wooden heels used on women's shoes, and over ninety per cent of all the wooden-heel machinery manufactured in the United States. The brick industry, also important, has been carried on in this locality for 200 years, and the manufacture of woolen hats has been prominent since the beginning of the eighteenth century. The leading woolen mills are the outgrowth of those established in 1835. Besides these commodities, the city produces large quantities of wooden and paper boxes and cement.

**History.** Haverhill was settled in 1640, when its Indian name of Pentucket was changed to Haverhill, in honor of the Rev. John Ward, the first minister, whose birthplace was Haverhill, England. The city was bought for three pounds ten shillings, and the original deed, dated 1642, and signed by the Indians and first settlers, may be seen at the home of the Historical Society. The early town suffered severely from the attacks of Indians, the

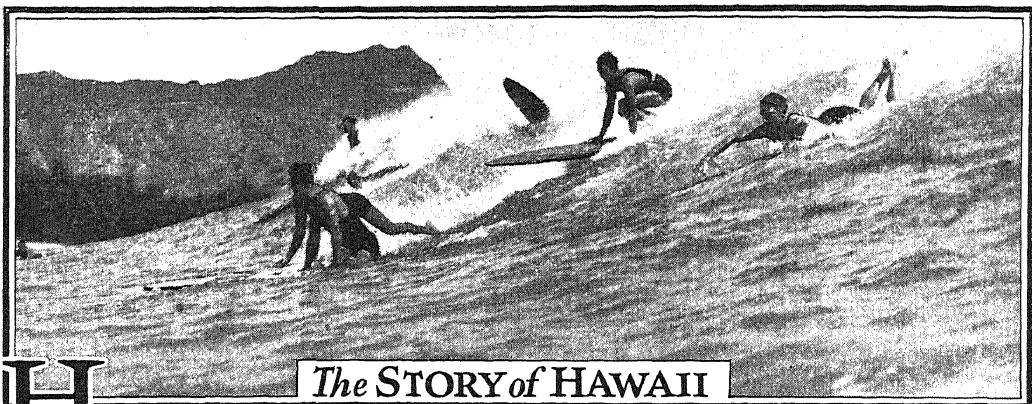
most noteworthy being one in 1698, when Hannah Dustan, with her babe, was captured and taken to New Hampshire, near the town of Penacook. With the assistance of two other captives, she scalped a number of the Indians and escaped to Haverhill. A monument to her memory has been erected in one of the parks. The city was incorporated in 1869. A fire in 1873 destroyed thirty-five business houses, and one in 1882 almost totally destroyed the shoe-manufacturing district, the loss being estimated at \$2,000,000. Bradford, a resi-

dential town, on the opposite side of the river, was annexed to Haverhill in 1896. The city is the site of Bradford Academy, one of the first American schools for girls. A new "lower bridge" was completed in 1926 at a cost of nearly \$1,000,000.

**HAVERSIAN, *ha vur' shan*, CANALS.** See BONE (Structure).

**HAVRE, *hah' vur*.** See FRANCE (Interesting Cities of France).

**HAW,** the fruit of the hawthorn shrub or tree. See HAWTHORN.



## The STORY of HAWAII

**H**AWAII, *hah wi' e*, OR HAWAIIAN, *hah wi' yan*, ISLANDS, a chain of mountainous islands near the middle of the Pacific Ocean. They are at once a beautiful playground, a source of important food products, and an outpost of American defense, for they belong to the United States. Politically they are known as the TERRITORY OF HAWAII.

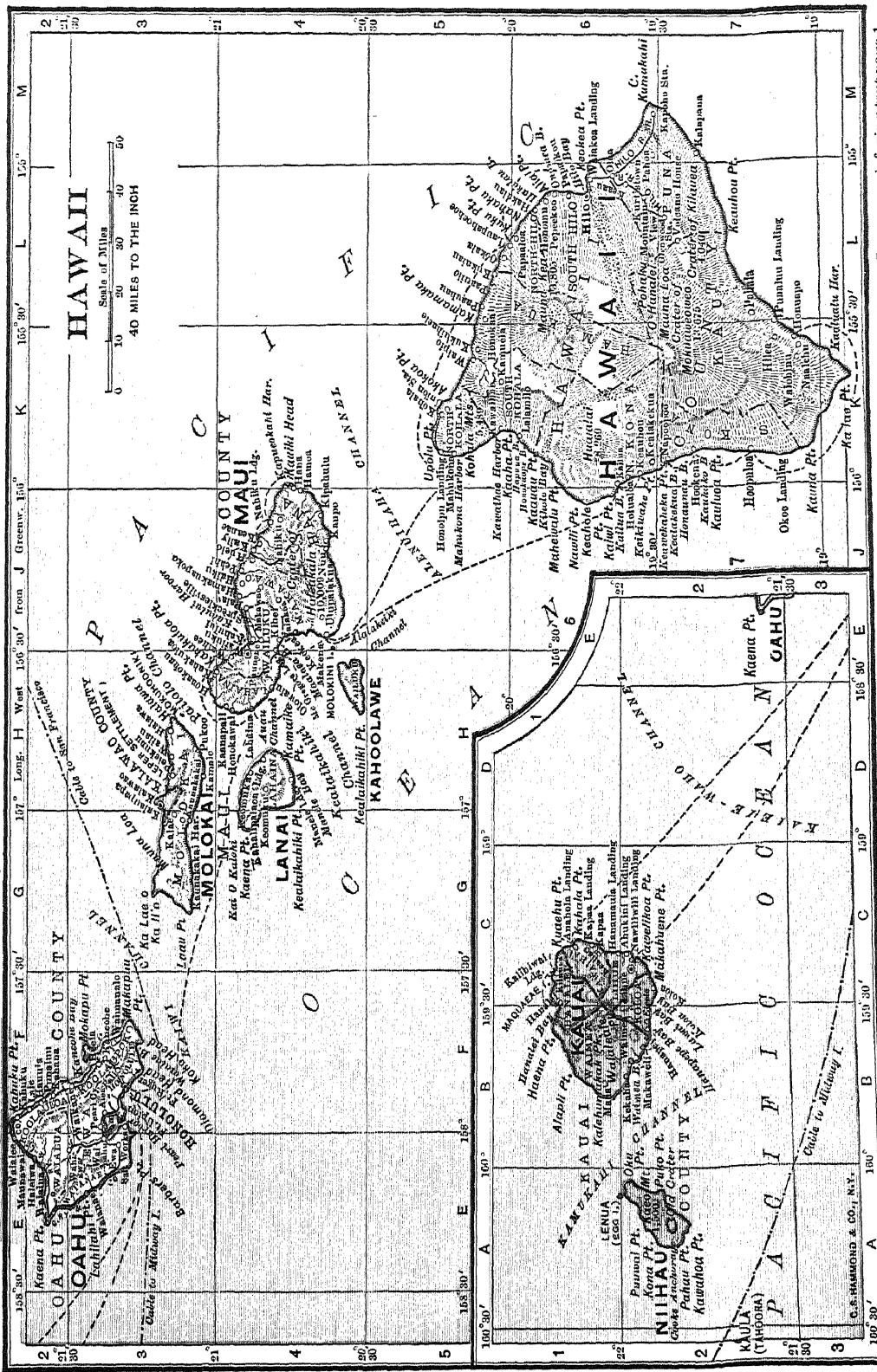
Their gentle, springlike climate, green forests and fields, and encircling blue sea, and their charming unhurried atmosphere have given them the name of "Paradise of the Pacific." Other natural advantages make them known as "the crossroads of the Pacific," for a glance at the map on page 308o will show how Western ocean routes from any point of the compass converge at Hawaii. The capital city, Honolulu, which is about 100 miles northwest of the center of the group of inhabited islands, is from 2,100 to 5,000 miles distant from the important Pacific Ocean seaports—those of Alaska at the north and New Zealand at the south; of the Americas at the east, and of Asia, the Philippine Islands, and Australia at the west. Out of the islands' ports go enormous cargoes of raw sugar and pineapples. One of the United States naval stations is at Pearl Harbor, ten miles from Honolulu.

The Hawaiian archipelago was formerly known as the *Sandwich Islands*, a name given them by Captain James Cook, their discoverer, in honor of the English Lord Sandwich. For

about ninety years before the islands came into the possession of the United States, the Hawaiian flag, a combination of the American and British flags, floated over the palace of the kings. King Kamehameha IV adopted it in 1854 as his own national flag, and his successors continued it as their emblem.

These islands stretch out in almost single file from southeast to northwest for over 1,200 miles, and lie a little over a thousand miles north of the equator. Eight of the islands are inhabited. The others are uninhabited rocks and reefs, valued by sportsmen as game-fishing grounds. The total area of the inhabited islands is 6,449 square miles, and is thus about equal to that of Connecticut and Rhode Island together. The population in 1920 was 255,912, a gain of nearly one-third in ten years. In 1926 it was 299,000, according to estimate of the Federal Census Bureau. Over two-fifths of the inhabitants are Japanese.

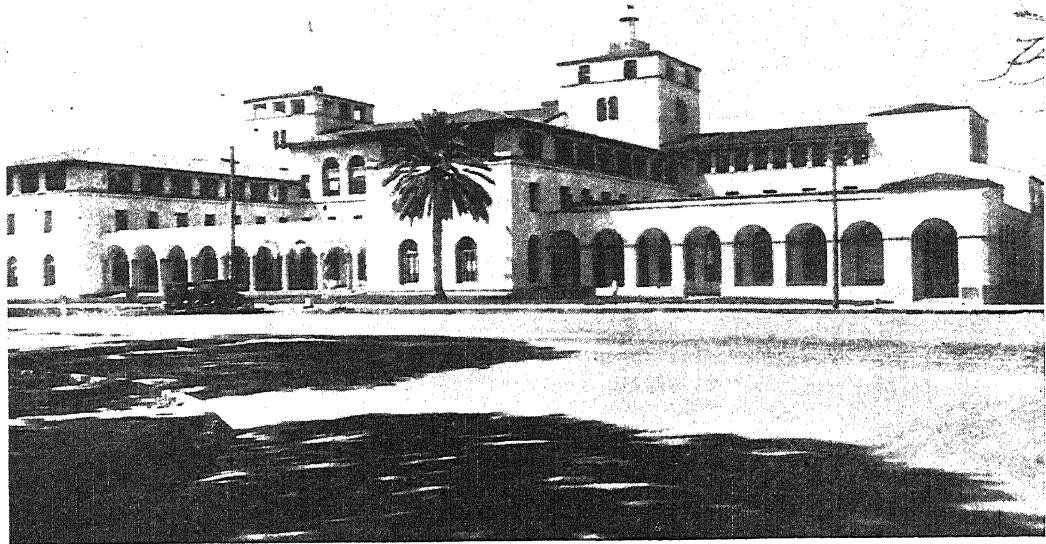
*Hawaii*, in the southeast, with a population of 65,000, and the largest island of the group, is remarkable for its lofty volcanoes; *Maui*, next in size, is a spot of tropical beauty, and has 36,000 inhabitants; *Kahoolawe*, lying south of Maui, is the smallest inhabited island of the group and had but three inhabitants in 1920; *Lanai* is about twice the size of the last-named, with 185 people; *Molokai*, with 1,800 people, is famous as the location of a leper settlement; *Oahu*, the third largest, but the most thickly populated (123,496 in 1920),



Engraved and printed expressly for THE WORLD BOOK

# HAWAII

|                             |     |                        |     |                              |      |                                |
|-----------------------------|-----|------------------------|-----|------------------------------|------|--------------------------------|
| Ahukini Landing             | C 2 | Kahakuloa              | H 3 | Kiholo Bay                   | J 6  | North Kohala (district), 6,275 |
| Niea                        | F 3 | Kahulu Point           | C 1 | Kilauea                      | C 1  | North Kona (district),         |
| Akokoia Point               | K 5 | Kahulipalaoa Landing   | H 4 | Kilauea, Crater of           | L 7  | K 6,3,709                      |
| Alalakeiki Channel          | J 5 | Kahana                 | F 2 | Kipahulu                     | K 4  | . . . . .                      |
| Misipi Point                | B 1 | Kahoolawe (island)     | H 5 | Kohala                       | K 5  | K 6                            |
| Alenehuhua Channel          | J 3 | Kahuku                 | F 2 | Kohala Mountains             | K 5  | Nuu, . . . . .                 |
| Alii Point                  | L 6 | Kahukulea Point        | J 3 | Koko Head                    | F 3  | J 4                            |
| Anahola Landing             | C 1 | Kahuku Point           | F 2 | Koloa                        | C 2  | E 2                            |
| Avau Channel                | H 4 | Kahului                | J 4 | Koloa Bay                    | B 2  | J 7                            |
| Barbers Point               | L 3 | Kahului Harbor         | J 4 | Koloa (district), 7,270      | B 2  | B 2                            |
| Cooks Anchorage             | A 2 | Kaueo-waho Channel     | D 2 | Kona Point                   | A 2  | M 6                            |
| Crater of Haleakala         | J 4 | Kailua                 | K 6 | Koolauloa (district),        |      | A 2                            |
| Crater of Kilauea           | L 7 | Kailua Bay             | J 6 | Onomea Bay                   | L 6  | H 4                            |
| Crater of Mokuaweweo        | K 7 | Kaili                  | J 4 | Ookala                       | L 5  |                                |
| Diamond Head                | F 3 | Kai O Kalohi           | G 4 | Paauhau                      | L 5  |                                |
| Egg Island (Lenua)          | A 1 | Kawi Channel           | F 3 | Pauilo                       | L 5  |                                |
| Eleele                      | C 2 | Kawi Point             | J 6 | Pahala                       | L 7  |                                |
| Ewa                         | E 3 | Kalae                  | G 3 | Pahau Point                  | A 2  |                                |
| Ewa (district), 17,899      | F 3 | Ka Lae o Ka Ilio       | G 3 | Paho                         | L 6  |                                |
| Fort Ruger                  | F 3 | Kalae Point            | K 7 | Paua                         | J 4  |                                |
| Fort Upton                  | F 3 | Kalipana               | M 7 | Pailolo Channel              | H 3  |                                |
| Glenwood Station            | L 7 | Kalauapapa             | H 3 | Pali                         | F 3  |                                |
| Haena Point                 | B 1 | Kalawao                | H 3 | Papaaloa                     | L 6  |                                |
| Haku                        | J 4 | Kaluiwai County, 667   | H 3 | Papaikou                     | L 6  |                                |
| Hakakau                     | L 6 | Kalchumakak Peak       | B 1 | Peahi                        | J 4  |                                |
| Hakakau Bay                 | L 6 | Kahului Landing        | C 1 | Pearl City                   | F 3  |                                |
| Halaawa                     | H 3 | Kamaika Point          | H 4 | Pearl Harbor                 | E 3  |                                |
| Halaawa Point               | H 3 | Kamalo                 | H 3 | Pelekunu                     | H 3  |                                |
| Haleakala, Crater of        | J 4 | Kamamaka Point         | L 5 | Pohaku O Hanalei             | L 6  |                                |
| Haleiwa                     | E 2 | Kamuela                | K 5 | Pukoo                        | II 3 |                                |
| Hamakua (district), 9,122   | K 6 | Kamukahi Channel       | A 1 | Puko Point                   | A 2  |                                |
| Hamakuaopoko                | J 3 | Kaneohe                | F 3 | Puna (district), 7,282       | L 7  |                                |
| Hamoa                       | K 4 | Kaneohe Bay            | F 3 | Punaluu                      | F 2  |                                |
| Hana                        | K 4 | Kapaa                  | C 1 | Punaluu Landing              | L 7  |                                |
| Hana (district), 3,100      | J 4 | Kapaa Landing          | C 1 | McGregors Landing            | H 4  |                                |
| Hanalei                     | B 1 | Kapoho Station         | M 7 | Maalaea Bay                  | H 4  |                                |
| Hanalei Bay                 | B 1 | Kapueokahi Harbor      | K 4 | Maheiwahu Point              | J 6  |                                |
| Hanalei (district), 2,549   | C 1 | Kau (district), 4,028  | K 7 | Mahukona                     | K 5  |                                |
| Hanamauka Landing           | C 1 | Kauai County, 29,438   | B 1 | Mahukona Harbor              | K 5  |                                |
| Hanapepe                    | B 2 | Kauai (island), 29,247 | B 1 | Makahuene Point              | C 2  |                                |
| Hanapepe Bay                | B 2 | Kauhako Bay            | J 7 | Makapuu Point                | F 3  |                                |
| Hapuna Bay                  | K 6 | Kauhi Head             | K 4 | Makawao                      | J 4  |                                |
| Hauula                      | F 2 | Kauhi (Tahooraa)       | A 2 | Makawao (district)           |      |                                |
| Hawaiian County, 64,895     | K 6 | Kauluoa Point          | J 7 | Linue                        | C 2  |                                |
| Hawaiian (island), 64,895   | K 6 | Kaunakakai             | G 3 | Lihue                        | C 1  |                                |
| Heeia                       | F 3 | Kaunakakai Harbor      | G 3 | Lihue (district), 6,223      | C 1  |                                |
| Iilea                       | K 7 | Kauna Point            | J 7 | Lihue                        | C 1  |                                |
| Hilo, 10,431                | L 6 | Kaupo                  | J 4 | McGregors Landing            | H 4  |                                |
| Hilo Bay                    | L 6 | Kawaho Point           | A 2 | Maalaea Bay                  | H 4  |                                |
| Holualoa                    | J 6 | Kawaihae               | K 5 | Maheiwahu Point              | J 6  |                                |
| Honakohau                   | H 3 | Kawaihae Harbor        | J 5 | Maquacaeas Island            | C 1  |                                |
| Honaunau Bay                | J 7 | Kawaihau (district)    |     | Maui County, 37,385          | G 4  |                                |
| Honopu Landing              | K 5 | Kealaikahiki Channel   | C 1 | Maui (island), 36,080        | J 4  |                                |
| Honokai                     | K 5 | Kealaikahiki Point     | G 4 | Mauna Kea                    | L 6  |                                |
| Honokaope Bay               | K 6 | Kealaikahiki Point     | H 4 | Mauna Loa                    | L 7  |                                |
| Honokawai                   | H 4 | Keahole Point          | J 6 | Mauna Loa                    | G 3  |                                |
| Honolulu (capital), 83,327  | F 3 | Kealaikahiki Point     | H 4 | Mauna Loa                    | L 6  |                                |
| Honolulu (district), 83,327 | F 3 | Kealaikahiki Point     | G 4 | Mauna Loa                    | G 3  |                                |
| Honomu                      | L 6 | Kealakekua             | J 7 | Mauna Loa                    | G 3  |                                |
| Honuapo                     | L 7 | Kealakekua Bay         | J 7 | Mauna Loa                    | G 3  |                                |
| Hookena                     | K 7 | Kealia                 | C 1 | Maolokai (district), 1,117   | H 3  |                                |
| Hoopolon                    | K 7 | Keanae                 | J 4 | Molokai (island), 1,784      | G 3  |                                |
| Huualalai                   | K 6 | Keauhou                | J 4 | Molokai (island), 1,784      | G 3  |                                |
| Huelo                       | J 4 | Keawekaheka Point      | J 7 | Molokai (island), 1,784      | G 3  |                                |
| Kaaha Point                 | K 5 | Keikiwahae Point       | J 6 | Molokai (island), 1,784      | G 3  |                                |
| Kaalualu Harbor             | K 7 | Kekaha                 | B 2 | Molokai (island), 1,784      | G 3  |                                |
| Kaanapali                   | H 4 | Keokka                 | J 4 | Molokini Island              | H 4  |                                |
| Kaauuu Point                | J 6 | Keokee Point           | M 6 | Mountain View                | L 6  |                                |
| Kaena Point                 | E 2 | Keomuka                | H 4 | Naaehu                       | K 7  |                                |
| Kaena Point                 | G 4 | Keomuku                | H 4 | Nahaku Point                 | L 5  |                                |
| Kaeo Mountain               | A 2 | Kihei                  | J 4 | Nahaku                       | J 4  |                                |
|                             |     |                        |     | Nahiku Landing               | J 4  |                                |
|                             |     |                        |     | Napoopoo                     | K 7  |                                |
|                             |     |                        |     | Nawiliwili Landing           | C 2  |                                |
|                             |     |                        |     | Niihau (island), 191         | A 2  |                                |
|                             |     |                        |     | North Hilo (district), 5,644 | L 6  |                                |
|                             |     |                        |     | Waialae                      |      |                                |
|                             |     |                        |     | Waimea                       |      |                                |
|                             |     |                        |     | Waimea Bay                   |      |                                |
|                             |     |                        |     | Waimea (district), 8,863     | B 1  |                                |
|                             |     |                        |     | Waiohinu                     |      |                                |
|                             |     |                        |     | Waipahu                      |      |                                |
|                             |     |                        |     | Waipio                       |      |                                |
|                             |     |                        |     | Walanae                      |      |                                |



FEDERAL BUILDING IN HONOLULU

is the wealthiest and most frequently visited of the islands, for it contains Honolulu, the beautiful seaport capital; *Kauai* (30,000 population) is irregularly circular in form, well watered everywhere, and is called the "garden isle"; *Nishau* is the westernmost of the inhabited islands, with 191 people in 1920.

**The People.** A dozen nations have contributed to the permanent population. The native Hawaiians are members of the Malayo-Polynesian race, who probably came centuries ago from Samoa. They are people of moderate size, with skin resembling tarnished copper. Their heads are short and broad, with dark-brown or black hair, large, expressive eyes, heavy features, and finely shaped, pearly white teeth. Their language is soft and full of harmony, consisting chiefly of vowels, and they are a race of sweet singers. They are intelligent, leisure-loving, fond of riding, and delight in water sports, of which surf-riding is one of the most interesting and exciting. The native Hawaiians are commonly called *Kanakas*.

Although the men and many of the women wear clothing of American fashion, a costume very generally worn by the native women of the islands is a loose Mother Hubbard-like robe known as a *holoku*, which is at least cool and comfortable, if not especially attractive. A pleasing custom of the hospitable Hawaiians is the decorating of arriving or departing friends with gay garlands of flowers called *leis*.

The pure Hawaiian population of the islands is decreasing, owing to disease and changes in mode of life introduced by foreigners. Only one-tenth of the people are pure Hawaiians; one-fourteenth are part Hawaiians. The Japanese form the largest group, numbering about 110,000. Besides these, there are about 27,000 Portuguese, 23,500 Chinese, 20,000 Americans, British, Germans, and Russians, and about 50,000 Filipinos. Restriction of immigration and exclusion of Chinese and Japanese from the United States apply also to the islands, and have cut off the growth of those groups. Many adult aliens have departed, and the increase in population has been through births, except among Americans and Filipinos. The latter have come in great numbers to supply the need for laborers. Anyone born in the islands, regardless of parentage, is an American citizen. In spite of the fact that Americans are exceeded by other groups in numbers, the spirit of the islands is essentially American. Modern dwellings are common throughout the islands. Bananas, sweet potatoes, yams, breadfruit, and coconuts constitute a large part of Hawaiian diet; the national dish, called *poi*, is a fermented paste made from the root of the *taro*, a plant of the same genus as those known in the United States as elephant's ear or caladium.

**Language and Religion.** In a population so mixed, both language and religion are naturally varied. English is the official language and is taught in the schools. Early mission-



Photo: P &amp; A

It is on the island of Oahu, about forty miles from Honolulu. Huge crowds of people of all nationalities wind their way by auto along the beach and through cane fields to worship at this shrine. Small children are carried by mothers to the stone, that they may kiss it and be healed.

aries succeeded in bringing Christianity to the native Hawaiians. The Chinese and Japanese usually retain their Oriental religions, and the languages of their home lands are commonly heard. About half of the population is Protestant, including Mormons; most of the Portuguese, however, are Roman Catholic.

**Cities.** The principal cities are the seaport-capital, Honolulu, on the island of Oahu, where about one-third of the entire population is concentrated, and beautiful Hilo, on the eastern coast of Hawaii. Honolulu is described elsewhere under its own title.

**Education.** Schools have existed in the islands since 1820, when several were established by early missionaries. Four years later 2,000 people had learned to read, and a general school system extended over the islands which has been gaining strength continually. School attendance is now compulsory for all children between the ages of six and seventeen, at either a public or a private school. Education in public schools is free. Because of the mixed population, pupils of many different nationalities attend the same school. There are nearly 200 public schools, with an attendance

of over 55,000. At Honolulu there is a high school, a normal school, an industrial reformatory for boys and one for girls, and a Territorial university, the University of Hawaii.

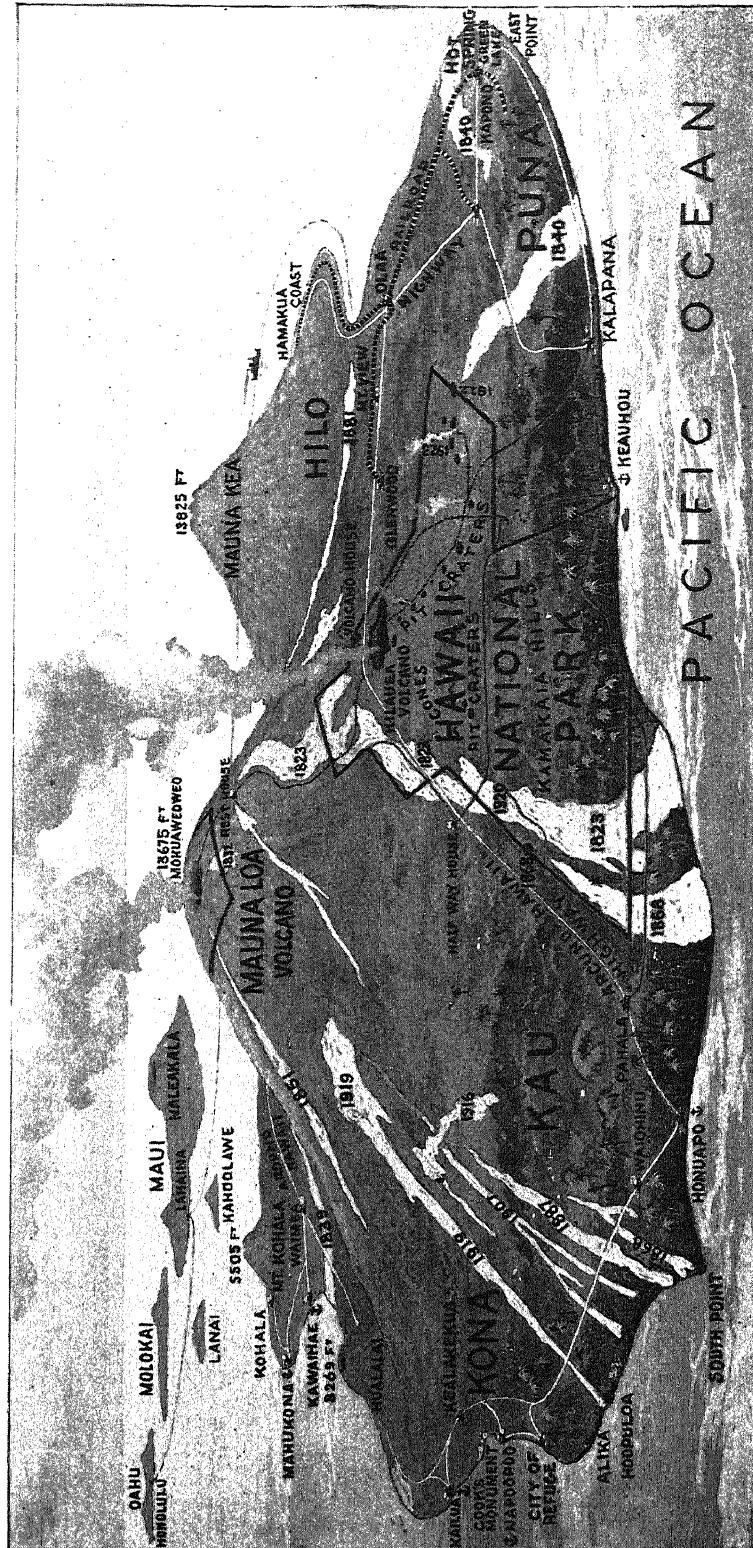
**Institutions.** In addition to the two reform schools mentioned, there is a state prison at Honolulu, as well as a leper hospital and homes for non-leprosy boys and girls of leprosy parents. On a low peninsula extending north near the center of the island of Molokai, and separated from the mainland by a precipice 2,000 feet high, is located a leper settlement.

**The Land.** These islands are the tops of large volcanic mountains which have been raised from the ocean bottom. Through the ages those busy little builders, the coral insects, have edged most of the islands with reefs, but none is entirely coral-reef-encircled. All of the islands are mountainous, but only Hawaii is actively volcanic. That island has two of the largest volcanic mountains in the world—Mauna Kea, 13,805 feet high; and Mauna Loa, 13,675 feet. The latter is easily ascended, and on its eastern slope is the far-famed Kilauea, a continuously active volcano. Most of the islands, especially Kauai, are cut

into deep ravines, gorges, and picturesque crags. Here and there the coasts are rocky, presenting to the sea bold cliffs that sometimes rise to heights of a thousand feet or more. In other spots the coasts are sandy beaches with protecting coral reefs. Between the inland mountains and the coasts extend fertile plains and valleys, where agriculture is extensively carried on. Hawaiian rivers are chiefly small mountain torrents.

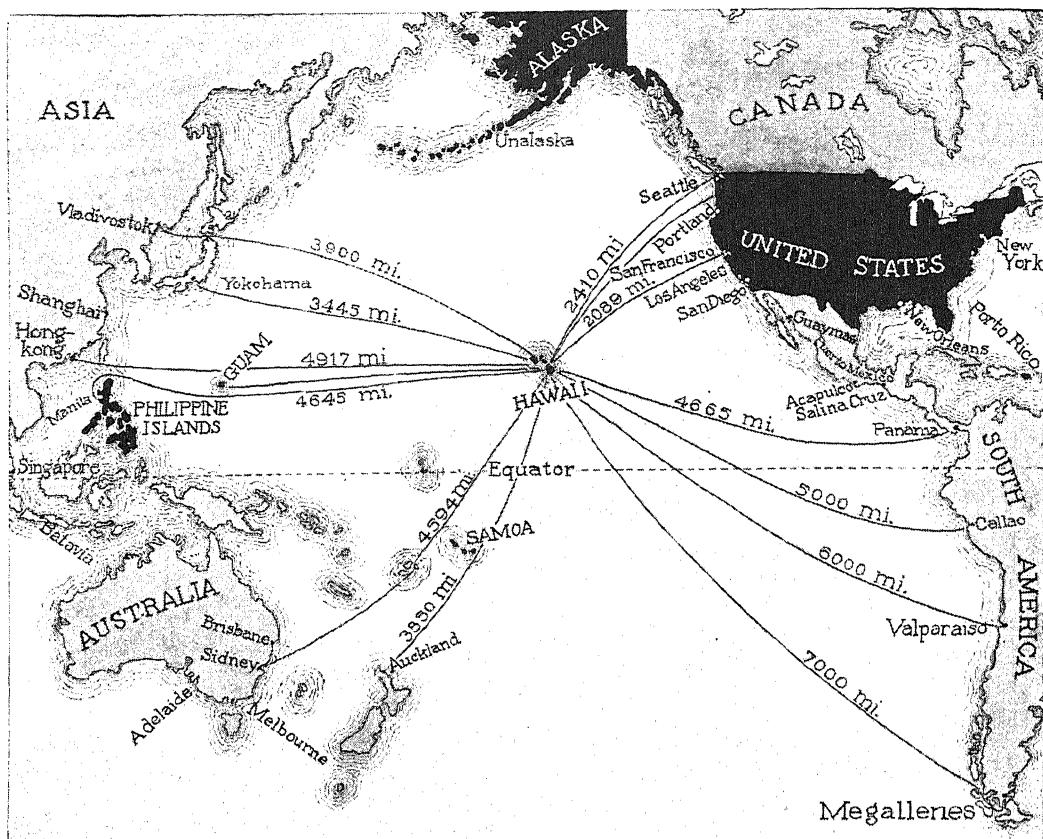
In 1916 Congress made the wonderful Kilauea region into a national park (see PARKS, NATIONAL).

Although naked lava fields occur, especially on the island of Hawaii, ferns and flowering plants abound, and many spots are luxurious riots of tropical verdure and color. Fruit-growing trees and shrubs are plentiful, and economically important grasses abound. Large upland areas are covered with forests of tropical trees, such as the *koa*, the candle-nut, and the *ohia*, or mountain apple, whose wood is valuable for the manufacture of furniture, flooring, posts, and railway ties. One of the most charming features of the landscape is the profusion of tall palm



Courtesy of Popular Mechanics

**THE ISLAND OF HAWAII**  
The southeastern isle of the Hawaiian group, showing the three famous volcanoes and the lava flows of the years of their flow.



## DISTANCES FROM HONOLULU TO OTHER PORTS

The land masses shown in black are the United States and its Pacific possessions.

trees, with their slender, graceful trunks and flower-like crowns of green fronds.

Hogs, dogs, and rats have been introduced on the islands, but about the only mammals native to the section are whales and dolphins. There are no snakes, and only a few lizards. Fish of various hues abound among the coral reefs. Beautifully colored birds are rare. Insects are numerous, and in many localities mosquitoes, wasps, cockroaches, locusts, and white ants are pests.

**Climate.** The Hawaiian Islands possess an even, healthful climate, moderate the year round, rarely too warm, and never cold. Owing to the trade winds and sea breezes, the mean temperature is about  $10^{\circ}$  cooler than that of continental areas in the same latitude. The average temperatures of the lowlands are  $70^{\circ}$  in January and  $78^{\circ}$  in July, the extremes being  $89^{\circ}$  and  $56^{\circ}$ . In December, when the greater part of North America is snow-bound and swept by icy winds, Honolulu gardens, fields, and mountainsides are bright with flowers and gay with the warble of birds under a smiling summer sky. Frost and snow occur on certain mountain peaks, some being snow-

capped throughout the year. Hurricanes and cyclones are unknown.

The rainfall and humidity vary in each locality. Above Hilo Bay, in Eastern Hawaii, the rainfall is from 100 to 200 inches a year; at Honolulu it averages about thirty-two inches. Irrigation is necessary, however, in many agricultural districts, especially on the island of Hawaii. Water is pumped from artesian wells, or surface water is conducted through ditches and tunnels. Hawaii's system of irrigation by means of *cane-flumes* excites the admiration of the engineering world.

**Industries.** The most important industries of the islands are agricultural. Hawaii, Maui, Kauai, and Oahu, especially, contain large tracts of fertile land, and climatic conditions are favorable to the pursuit of agricultural industries. Scientific studies instituted by the United States Department of Agriculture, the increase in Pacific commerce, and the American tariff have also been factors in Hawaii's growing prosperity.

The largest industry of the islands is the growing of sugar cane and the production of raw sugar. Nearly 125,000 acres of lowland

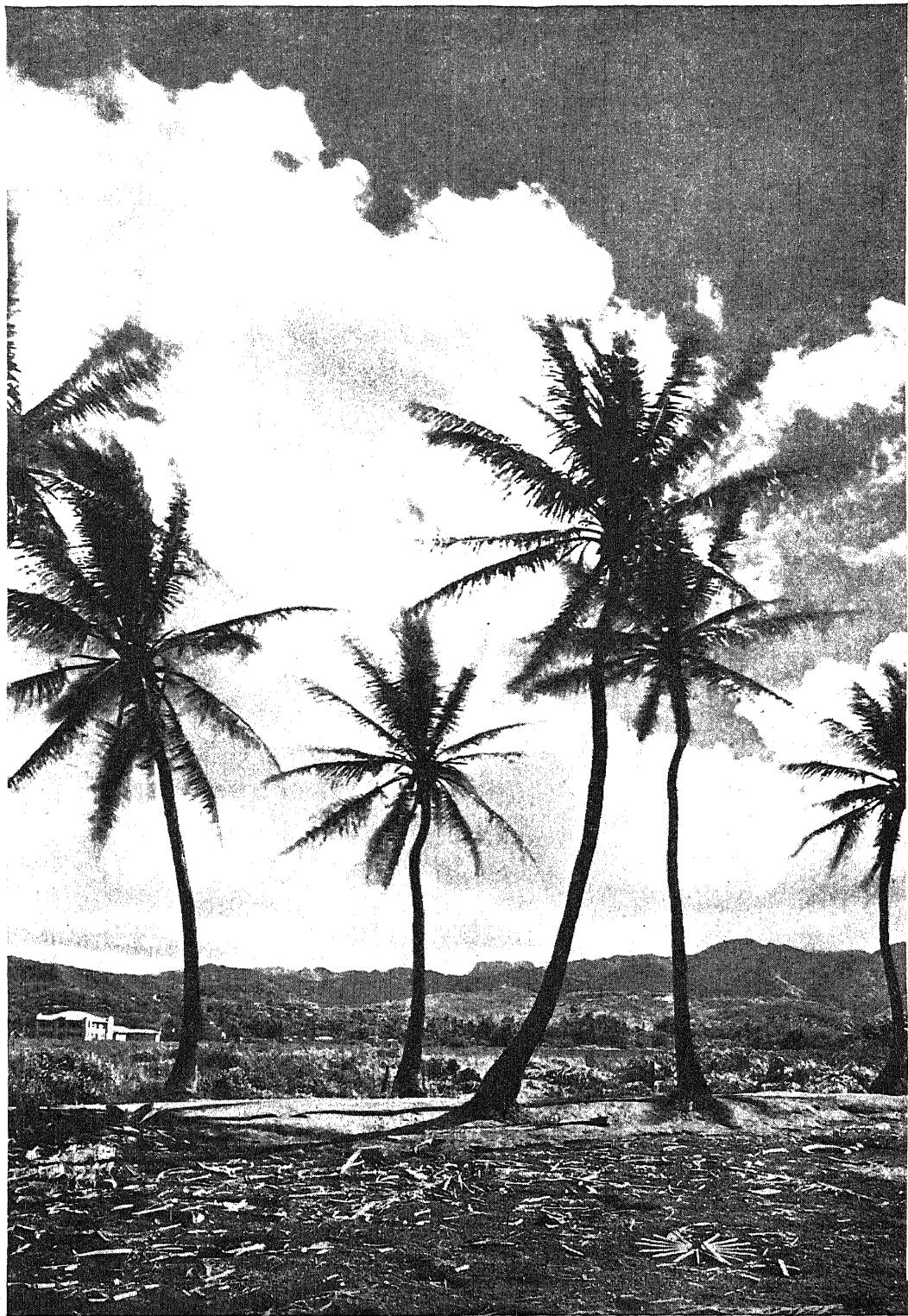


Photo: U & U

**Where Every Prospect Pleases.** A view from a point near the famed Waikiki Beach, looking toward Mount Tantalus and the Koolau range of hills. This is a typical Hawaii landscape. 308r



Photo: Baker

## TROPICAL LOVELINESS WHERE LEAST EXPECTED

Foliage on the slopes of Haleakala, the world's largest crater, in Hawaii National Park. The volcano burned out long ago.

are devoted to cane and about half of the plantations are irrigated. Scientific methods have resulted in a larger yield of sugar per acre than in any other country, an average of about six tons of raw sugar per acre, but the cost of production is correspondingly greater. The average yearly crop of sugar is about 700,000 tons, valued at from \$65,000,000 to \$80,000,000. The plantations and the mills are owned by corporations, which hire the laborers, giving them housing, fuel, water, and medical attention free. Much has been accomplished in improving the living conditions of the laborers in recent years. One of the most impressive sights seen by visitors to the islands is a field of burning sugar cane; the controlled burning of the field before harvesting strips the stalks bare of leaves, a process which formerly had to be carried on by hand or by machinery.

The growing and canning of pineapple is the second industry of importance, having increased more than a thousand per cent in somewhat more than thirty years. About 46,000 acres are under cultivation, and the canned product from this area is valued at more than \$34,000,000 yearly. Long strips of mulching paper cover the pineapple fields, and the plants are set out in holes in this paper; this keeps the ground moist, prevents weeds,

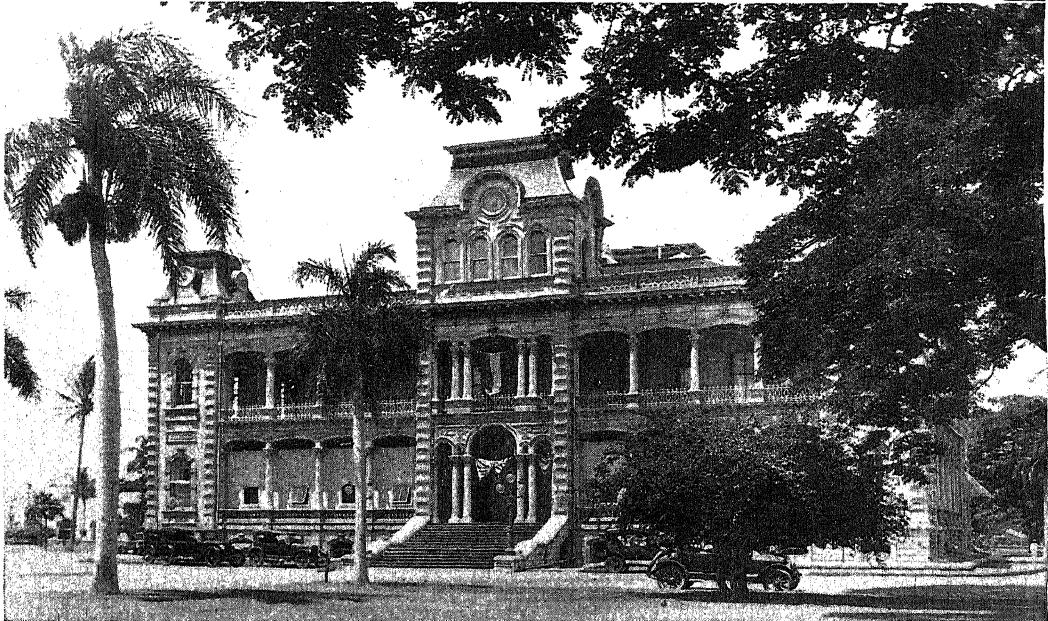
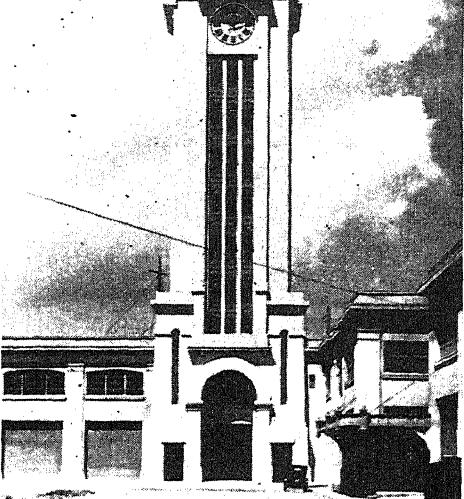
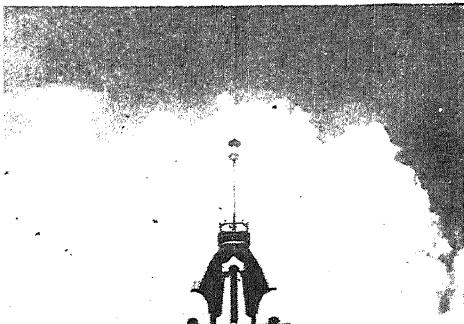
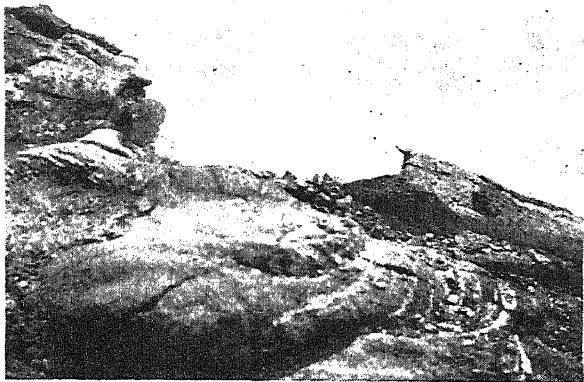
and has greatly increased the yield of fruit. Bananas, limes, oranges, and breadfruit are also grown.

Rice is grown in the lowest flats, and is cultivated mainly by the Chinese. Most of this product is used in the islands, but a small quantity is exported to the United States. Coffee is cultivated to a small extent. The tobacco industry is developing, and a recently founded industry is the raising of Bermuda onions.

Although most of the meat raised is used on the islands, the livestock industry is important, for pasturage is good in the uplands.

Most of the manufacturing industries are those for the production of sugar, the polishing of rice, cleaning of coffee, and canning of pineapples. The largest fruit cannery in the world is devoted to the canning of pineapple. Lack of unskilled labor is the principal drawback to the growth of all industries, and restricted immigration has made the shortage more acute. The sugar-producers have assisted the immigration of Filipinos in large numbers.

**Mineral Resources.** Although no important mineral deposits have been discovered on the islands, many minerals have been found, but in quantities too small to repay development; among them are sulphur, gypsum,

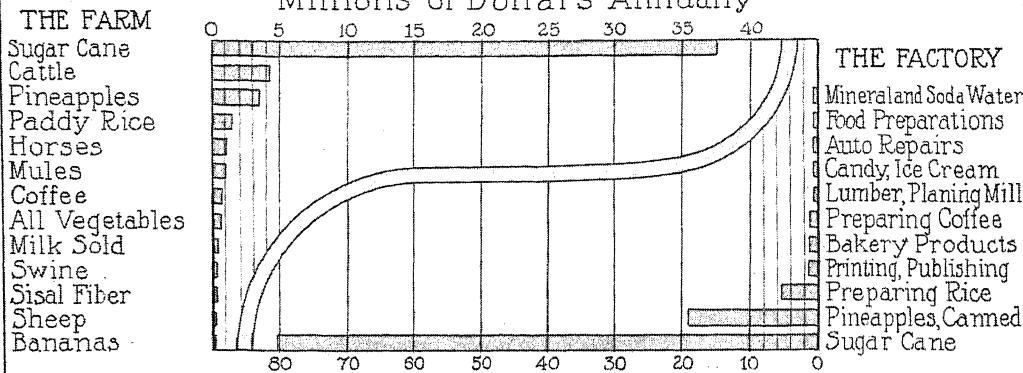


PHOTOS: O R O C; AASTONE; U & U; P & A

Views in Hawaii. Upper left, the fire pit inside Kilauea, a seething mass of lava. Below, a typical grass hut. At right, Aloha Tower, in Honolulu (*aloha* means greeting and farewell). At bottom of page, former royal palace, now office of the governor.

## HAWAII PRODUCTS CHART

Millions of Dollars Annually



FIGURES REPRESENT AN AVERAGE FOR THREE YEARS

kaolin, and mineral paints. Building stone and lime are produced for local use. The gathering of sea salt has become a local industry in some places. Pearls have been found, but no commercially important pearl industry has been established.

**Transportation and Communication.** Good roads have been constructed in the islands, and there are about 350 miles of railway, exclusive of light, narrow-gauge plantation lines. The principal railways are on the islands of Oahu and Hawaii. The city of Honolulu has an excellent street-railway system. An inter-island navigation company provides communication between the different islands. Several lines of steamers connect the islands with the United States, Mexico, Canada, Japan, China, the Philippines, and Australia, and Hawaii is a point of call for trans-Pacific traffic. The opening of the Panama Canal has effected more speedy water communication with Eastern America and Europe.

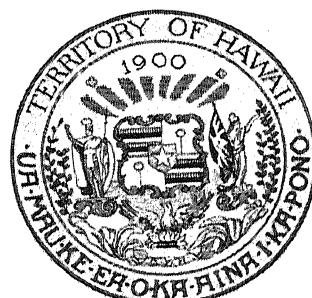
The Honolulu port has been dredged and enlarged to admit the largest steamers, and wharfage accommodations at that point have been increased. At the city of Hilo, island of Hawaii, is an important sugar-shipping point, and a large breakwater has been built there. A breakwater has also been constructed at Kahului, the principal port of the island of Maui, and a harbor for that point has been provided.

Extensive improvements have been made by the United States government at Pearl Harbor, United States naval station near Honolulu. The map on page 3080 indicates the position of the Hawaiian Islands in relation to countries of the Pacific, and shows that Pearl Harbor is one of the most important naval stations belonging to the United States government. A dry dock was officially opened in 1919.

Hawaii is connected by cable with both Pacific shores. Wireless telegraphy affords inter-island and Pacific-coast communication; wireless messages have been sent from the naval wireless station at Arlington, opposite the city of Washington, to Honolulu. There are telephones on the five largest islands, and all the large communities are lighted by electricity.

**Government.** As a territory of the United States since 1900, Hawaii has a government similar to that of other organized territories of the United States, such as Alaska and the Philippines (see TERRITORY). A governor and a secretary are vested with executive power, and are appointed by the President of the United States for a term of four years. A legislature of two houses consists of a senate of fifteen members elected for four years, and a house of representatives of thirty members elected for two years. Sessions are held every two years and are limited to sixty days. A delegate elected every four years represents the territory in the United States House of Representatives (see DELEGATE).

**History.** Not much is known of the history of the islands before their discovery by Captain James Cook in 1778, although Gaetano is said to have first seen them, in 1542 or 1555. Captain Cook lost his life in a conflict with the natives in 1779. At that time each island had a king, but in 1790 Kamehameha I, by force



SEAL OF THE TERRITORY



Photo: U &amp; U

## WAIKIKI BEACH

A picturesque view of the beach, where surf riding is a popular, though hazardous, pastime.

of arms, formed them into one kingdom under his rule. When he died, in 1819, his son, Liholiho, succeeded him, with the title of Kamehameha II. His reign was famous for the abolition of idolatry and of the system of taboo. American missionaries visiting the islands in 1820 were well received, as the king saw the necessity of introducing a religion to replace the one which he had abolished. In 1823 Kamehameha II and his queen visited England, and both died there in 1824.

The widow of Kamehameha I then gained power and ruled for nine years, when the younger brother of the last king, reaching his majority, ascended the throne. Kamehameha III granted a constitution providing for a government consisting of a king, an assembly of nobles, and a representative council. The independence of the Hawaiian kingdom was formally guaranteed by the French and English governments in 1843. Kamehameha IV (1854-1863) promoted the principles of civilization, and during the reign of his brother, Kamehameha V, foreign commerce and local business prospered. With the death of the latter in 1873, the line of Kamehamehas became extinct. A series of short, troubled reigns ensued until, with the reign of Queen Liliuokalani, matters reached a crisis. She ascended the throne in 1891. It immediately became evident that she intended to rule without a constitution. Headed by the progressive party, a revolution broke out, and the queen was deposed. A provisional government was then

formed, and as overtures for annexation to the United States were not favorably received, owing in large measure to the opposition of President Grover Cleveland, the Republic of Hawaii was proclaimed on July 4, 1894. A constitution modeled after that of the United States was adopted.

After repeated efforts to have the islands annexed to the United States, Sanford B. Dole, the President of Hawaii, and earlier a judge of the Supreme Court of the islands, visited Washington in 1888 in the interest of annexation. In July of that year, President McKinley signed a joint resolution passed by Congress, in accordance with which he appointed a commission to visit the islands and map out a plan of government. A month later the United States took formal possession of the islands. In April, 1900, an act of Congress made provision for a territorial government, and Dole, the former President of the republic, was made governor. Since that time Hawaii has been increasingly prosperous, and the assessed value of property has increased fourfold. Forward movements in America are quickly adopted in the islands. For example, there are workmen's compensation laws, courts of domestic relations, and (in advance of the United States) uniform laws governing aeronautics. Child-labor laws are strict; junior high schools are popular. H.F.C.

**Related Subjects.** The following articles in these volumes give additional information on subjects connected with Hawaii:

## Outline and Questions on Hawaii

### I. Location and Size

- (1) Central position in Pacific
- (2) Number of islands
- (3) Area of inhabited islands
- (4) Comparative size of islands

### II. People

- (1) Population
- (2) Mixed character of population
- (3) Language
- (4) Religion and education

### III. Physical Features and Climate

- (1) Volcanic origin
- (2) Present-day volcanoes
- (3) Short, rapid rivers
- (4) Character of coastline
- (5) Moderate climate
- (6) Rainfall

### IV. Industries and Transportation

- (1) Agriculture
- (2) Comparatively unimportant manufactures
- (3) Mining
- (4) Railways—1,000 miles
- (5) Harbors and steamship lines

### V. History and Government

- (1) Discovery and exploration
- (2) Growth under Kamehamehas
- (3) Period of revolution
- (4) Annexation to United States
- (5) Government as a territory

## Questions

Why is Hawaii called an "island paradise"?

What language is taught in the schools?

What naval station has the United States in the islands?

What is *poi*?

How many street railways are there in the islands?

What is the ordinary dress of a native Hawaiian woman?

What has been the effect on the country of annexation to the United States?

Why was the last queen deposed?

What famous settlement is there on Molokai?

What unique system of irrigation is there on the islands?

What explorer lost his life in the Hawaiian Islands?

How are the islands represented in the United States Congress?

What did Captain Cook call Hawaii?

What is the most active volcano in the world? Describe it.

What is the most important product of the islands?

|                  |                  |
|------------------|------------------|
| Cook, James      | Mauna Loa        |
| Dole, Sanford B. | Molokai          |
| Honolulu         | Palm             |
| Kanakas          | Pineapple        |
| Kilauea          | Rice             |
| Leprosy          | Sandwich Islands |
| Liliuokalani     | Sugar            |
| Mauna Kea        | Taboo            |

### HAWAIIAN AIRPLANE FLIGHT, FIRST.

See AIRCRAFT (First Great Feats in Flying).

**HAWAII NATIONAL PARK.** See PARKS, NATIONAL; HAWAII (The Land).

**HAWFINCH.** See GROSBEAK.

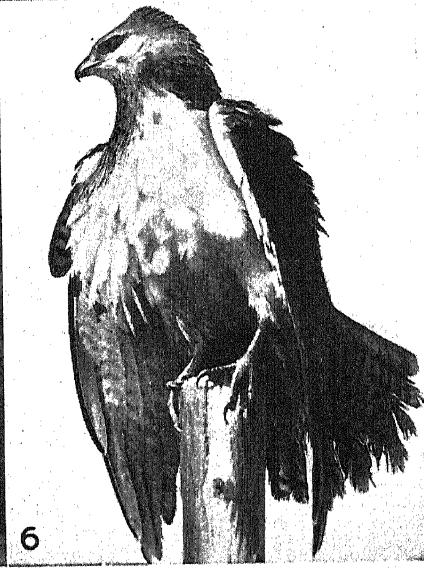
**HAWIKUH**, one of the legendary Seven Cities of Cibola. See CIBOLA, SEVEN CITIES OF.

**HAWK**, a general name applied rather indefinitely to a large number of birds of prey found all over the world. They are distinguished from owls and vultures by their habit of feeding during the day and by not being carrion-eaters. When used by falconers, they are called *ignoble* birds of prey, for, though resembling true falcons, they are less powerful, have shorter wings and longer legs, and their beaks are not notched or toothed.

**General Characteristics.** Hawks vary in size from ten to twenty-two inches in the males, and from twelve to twenty-four inches in the females. The mother hawk is usually larger, stronger, and more bold than the father, for upon her is imposed most of the care of the young. The bills are strong, sharply curved, and fitted for tearing. The claws, or talons, are so constructed that when the legs bend at the knees, they close tightly and will not open until the legs are straightened. In this way hawks obtain a tight hold on their prey. They live chiefly on insects, snakes, and small animals, such as field mice and ground squirrels. Some species also kill birds and poultry, but scientific investigations have shown that many species of hawk which are being killed by farmers as pests are really important helpers in keeping down the numbers of insects and animals which are injurious to crops. Bulletins have been issued by the government to aid farmers in recognizing their hawk friends and enemies, and these may be obtained on application to the Department of Agriculture.

Most hawks build rough nests high in trees, but some live in bushes. According to species, two to six eggs are laid. Downy, helpless young are hatched in about four weeks, and they stay in the nest until they are able to fly. Hawks are devoted parents as well as true lovers, and most of them remain mated for life. Young hawks are usually more darkly colored than mature birds, and are more or less striped or spotted beneath.

**Species.** Of American hawks, the following are comparatively harmless, and should be spared for duty in the fields in removing destructive pests: the large *marsh hawk* (which



Photos: Visual Education Service; U & U

Some of the Species. (1) Shay's shinned hawk. (2) American sparrow hawk. (3) Red-shouldered hawk.  
(4) Red-tailed hawk. (5) Marsh hawk. (6) Chicken hawk.

see); the *red-tailed* and *red-shouldered hawks* of Eastern and Central North America, frequently and unjustly called *hen* and *chicken hawks*; the dusky-brown *Swainson's hawk*, common throughout Western America; the *broad-winged hawk*, of the eastern half of North America; and the large, dark *rough-legged hawk* of the United States, Canada, and Alaska. All of this group except the marsh hawk are classed as buzzards. The *sparrow hawk* belongs to the same genus as true falcons.

The hawks harmful to agriculture because of their fondness for useful birds and poultry include the following: the *goshawk*, described elsewhere under that title; *Cooper's hawk*, a large, stealthy bird of the United States and Southern Canada; and the *sharp-shinned hawk*, smaller than the Cooper's, and of more northerly range, but resembling it in appearance and habits. The injurious hawks capture their prey by making sudden darts at them. They fly swiftly over the country, rather low in the air, and when pursuing flying birds, catch their prey on the wing. These hawks are long-tailed, short-winged birds, and should be distinguished from the beneficial hawks, which are often shot for crimes they do not commit. No hawk should be killed unless it is actually seen doing damage to poultry. D.L.

**Scientific Names.** Hawks are placed in the family *Falconidae*, which includes true falcons, kites, and eagles. The marsh hawk is *Circus hudsonius*. The red-tailed is *Buteo borealis*; the red-shouldered, *B. lineatus*; Swainson's, *B. swainsoni*; the broad-winged, *B. platypterus*. The rough-legged is *Archibuteo lagopus sancti-johannis*. The goshawk is *Astur atricapillus*; Cooper's is *Accipiter cooperii*; the sharp-shinned, *A. velox*.

**Related Subjects.** The reader is referred in these volumes to the following articles:

|           |              |
|-----------|--------------|
| Buzzard   | Marsh Hawk   |
| Falcon    | Owl          |
| Fish Hawk | Sparrow Hawk |
| Goshawk   | Vulture      |

**HAWKEYE STATE**, the popular name for Iowa (which see).

**HAWKING.** See FALCONRY.

**HAWKINS, SIR ANTHONY HOPE** (1863-), an English novelist who has written many widely read stories under the pen name of ANTHONY HOPE. He was born in London and educated at Marlborough and at Oxford. After leaving college he studied law, practicing from 1887 until 1894. He then decided to devote himself to literature. In 1918 he was knighted.

**His Writings.** Hawkins has a gift of writing interesting stories in a sparkling style and with a touch of reality, a combination that has made him very popular. His first pronounced success, *The Prisoner of Zenda*, appeared in 1894 and had gone through its sixtieth edition in 1914. This brilliant story of an imaginary kingdom in Germany was adapted for moving-picture presentation, as was its sequel,

*Rupert of Hentzau*. On the stage, these were a great success with James K. Hackett playing the hero part. Other novels and stories include the witty *Dolly Dialogues*, *Phroso*, *The King's Mirror*, *The Intrusions of Peggy*, *Double Harness*, *A Servant of the Public*, *Sophy of Kravonia*, *Mrs. Maxon Protests*, *Captain Dieppe*, and *Lucinda*. Some of his later novels are graver in tone than his earlier successes, but the author's wit and cultured style are never lacking.

**HAWKINS, OR HAWKYNS, SIR JOHN** (1532-1595), a British admiral, who learned seamanship from his family of sailors and owners of ships. He took a very active part in adventure on the seas, at the beginning of the great epoch of Elizabethan maritime enterprise, by sailing to the coast of Guinea, where he robbed Portuguese slave-trading vessels, then smuggled the captured negroes into the Spanish possessions of the New World. Two other successful expeditions brought him renown, and he was given a coat of arms with a negro, chained, as his crest. Hawkins was elected a member of Parliament, and was given the office of treasurer and comptroller of the royal navy. As a reward for his valor in the conflict with the Spanish Armada in 1588, he was knighted by Queen Elizabeth. In 1595 he accompanied Drake on an unsuccessful voyage to the West Indies in search of treasure. He died at sea, off Porto Rico. See ARMADA.

**HAWK MOTH**, any species of a family of beautiful and interesting moths known also as *sphinx moths*. The name *hawk* was given in reference to the general hawklike shape of the body, which is neatly tapering and provided with long, narrow, pointed wings, the hind pair being much the smaller. When resting, the caterpillars of these moths raise the fore part of the body and draw the head in, and in this position they somewhat resemble the sphinx of sculpture (see illustration under SPHINX). This name has been transferred to the moths themselves. The hawk moths are noted for the variety and attractive blending of their color patterns. Most of them are night flyers. They feed on the nectar of flowers having trumpet-shaped blossoms, to reach the nectar of which they uncoil a long tube or proboscis attached to the head. Their habit of hovering over the honey cups of flowers has given them another name, *humming-bird moths*. The caterpillars of some hawk moths are injurious plant pests. Among these is the tobacco worm, pictured in the article TOBACCO. W.J.S.

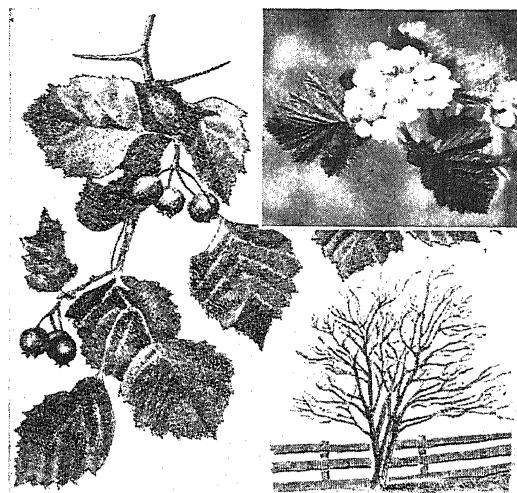
**Scientific Name.** The scientific name of the hawk-moth family is *Sphingidae*.

**HAWKSBILL.** See TURTLE (Sea Turtle).

**HAWK'S NEST.** See WEST VIRGINIA (The Land).

**HAWTHORN**, a name properly belonging to a genus of spiny or thorny plants of low, dense growth, with handsome foliage that changes to brilliant scarlet or yellow in autumn. The

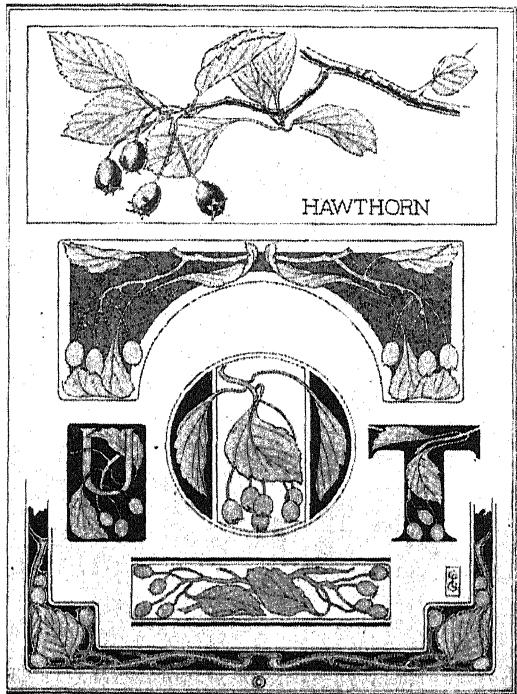
fruit, or haw, is a fleshy berry, within which is a hard stone. Hawthorns bear fragrant white,



THE HAWTHORN

Form of the tree, as seen in winter; leaves, flowers, and berries. The small insert is red haw.

pink, or red flowers. The common English hawthorn is a favorite hedge plant, and is



FOR A BOOKLET

The illustration shows parts of a cover border, initial letters, and ornamentation for pages.

famous for the beautiful display it makes in May, when its flowers transform the English countryside into a glory of white.

In America there are several species. Of these the handsomest is the *scarlet haw*, a small tree with crooked, spreading branches, white flowers, and orange-scarlet haws that ripen in late summer and fall in September. They are well flavored, and are sometimes used for making jelly. This species is one of the best of lawn trees, because of the beauty of its flowers, foliage, and fruit, and its immunity to insects.

G.M.S.

**Scientific Names.** The hawthorns belong to the rose family, *Rosaceae*. The English hawthorn is *Crataegus oxyacantha*; the scarlet haw, *C. mollis*. *C. coccinea*, a closely related American species, is also called scarlet haw, but its bright-colored fruit is inedible. Cockspur thorn, *C. crus-galli*, was formerly a favorite hedge plant in Newcastle County, Delaware.

**HAWTHORNE, NATHANIEL** (1804-1864), one of the greatest writers that America has produced. Few authors have been able to read more clearly the true inner meaning of men's lives, and the Puritan New England of his day is vividly portrayed in nearly all of his delightful romances.

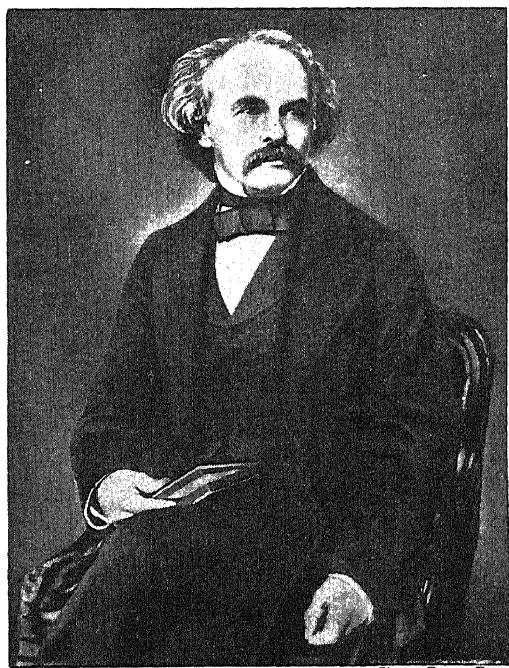


Photo: Brown Bros.

NATHANIEL HAWTHORNE

**Early Life.** Hawthorne was born on July 4, 1804, at Salem, Mass., of a family which had numbered among its members soldiers and sailors, but never, until the coming of Nathaniel, a dreamer and a writer of tales. His father died when the boy was but four years old, and his mother's grief was so great that he seems to have felt its shadow, even in his early years.

Little attempt was made to give him formal schooling, but he read widely and with keen appreciation, delighting especially in *Pilgrim's Progress*, *The Faerie Queene*, Shakespeare's dramas, and Milton's poems. Better even than his books, however, he loved his long, solitary rambles, and after he removed with his mother to Lake Sebago, Me., his love for solitude increased. In his later life, he much regretted this tendency, but at this time he knew no joy so great as roaming the forests with his gun, or skating upon the lake in the moonlight.

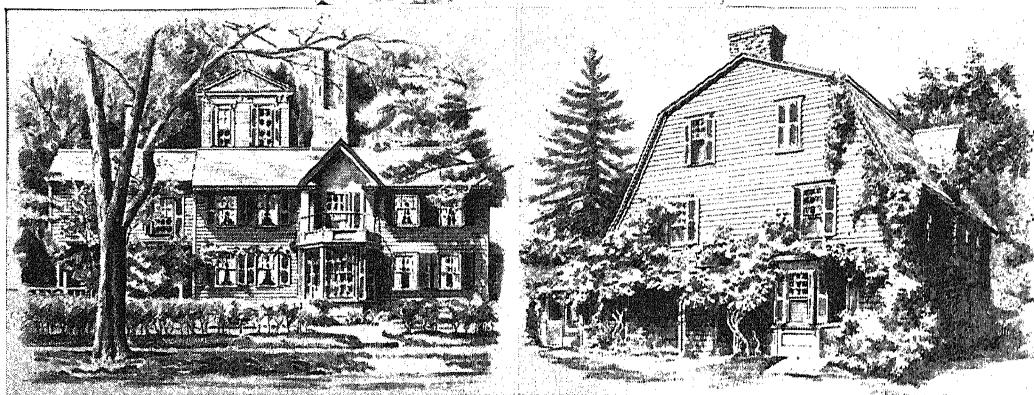
In 1821 he went to Bowdoin College, where he had as fellow students Longfellow and Franklin

but those about him seem to have accepted it as a matter of course.

**Literary Career.** For a year Hawthorne lived at Brook Farm (which see), but he loved solitude too well to find communistic life attractive,

and it was with real happiness that he settled down in 1842 in the "Old Manse" at Concord, with his wife, Sophia Peabody. The returns from his books, which by this time included *Grandfather's Chair* and *Mosses from an Old Manse*, in addition to the *Tales*, were still small, and in 1846 he accepted the post of surveyor in the customhouse at Salem.

During the three years he held that office, he wrote almost nothing, but



HOUSE OF THE SEVEN GABLES

HAWTHORNE'S HOME, "WAYSIDE"

THE OLD MANSE

Pierce. His college work showed no special genius, nor does it seem to have awakened in him the desire for any specific occupation. Returning, in 1825, to Salem, he settled into the seclusion which he loved, and for twelve years the world heard nothing of him. He wrote much, but little passed the severe critic to whom he subjected it—himself. Occasionally, articles from his pen appeared in periodicals, and in 1837 these were reprinted in a little volume called *Twice-Told Tales*. This was not eagerly greeted as the first work of a new genius; on the contrary, it was almost neglected, despite Longfellow's enthusiastic praise. Since it, with his other literary ventures, did not bring in enough to support him, he served for two years (1839-1841) as weigher in the Boston customhouse. To readers of to-day there is something incongruous, almost sacrilegious, in the thought of the author of *The Scarlet Letter* weighing out coal and grain;

his mind was busy; so when a change in political parties removed him from office, he was ready to begin at once on *The Scarlet Letter*, a tale of austere colonial times in New England. Its publication made him famous, not only in his own country but in Europe, and he needed to seek no more customhouse positions. All his works that followed—*The House of the Seven Gables*, *The Wonder Book*, *The Blithedale Romance*, *Tanglewood Tales*, *The Marble Faun*, and others—were eagerly read, and he was far more sought after than he desired to be. The last-named book, a curious, weird study of life in the American artist colony at Rome, was the outgrowth of his European experience; for in 1853 he was sent by his former college mate, President Pierce, as consul to Liverpool, and after five years of residence there, he lived for a year and a half in Italy. After his return to the United States, he brought out but one book, which, under the title of *Our Old*

*Home*, gave his impressions of England. *The Dolliver Romance*, *Dr. Grimshawe's Secret*, and *Septimus Felton* were left unfinished at his death, which occurred on May 18, 1864, at Plymouth, N. H., while he was traveling with Ex-President Pierce.

**Estimate of Hawthorne.** Despite his shyness and what he called his "cursed habit of solitude," he had made many friends, for his handsome face and manly bearing attracted all who met him, while his modesty, and the strength that was evident through his gentleness, won him lasting admiration and respect. As for his works, their reputation has grown with the years, for his mastery of the intricacies of human nature is no more remarkable than is his style, which is easy, delicate, and exquisitely pure.

He was not, in the modern sense of the word, a "realist"—that is, he did not picture detailed happenings and everyday surroundings merely for the purpose of producing an accurate mental photograph. Close observer as he was, he saw that there was something back of the things which could be seen and felt, and that this was the only part of life that really counted. His romances, therefore, are of a spiritual character, and his adventures are the adventures of men's souls.

**Julian Hawthorne** (1846—), the son of Nathaniel, is also a novelist, but while his works show a certain strength and facility, they are not productions of genius like those of his father. He was born in Boston, studied at Harvard, and then took up civil engineering, for which, however, his liking was slight. After 1871 he gave up all his time to literature, publishing the novels *Bressant*, *Sebastian Strome*, *A Fool of Nature*, and *Noble Blood*, and a life of his father and mother. In 1913 Hawthorne, with others, was tried for alleged misuse of the mails in promoting mining ventures, and while it was recognized that he had been drawn into the transactions by others, he was found guilty and sent to the Federal prison at Atlanta. Of his experiences there, he wrote in *The Subterranean Brotherhood*. In 1928 he published *Shapes That Pass*.

**HAY**, a name given to the foliage and stems of a number of fine-stemmed plants when dried for use as food for cattle and horses. The chief plants cultivated for this purpose are timothy, blue grass, red top, and other tame grasses; various kinds of wild or prairie grasses; alfalfa, clover, velvet beans, and other legumes; and rye, barley, and oats. The crop, when cut, is allowed to lie on the ground until sufficiently dry to store. The time taken for drying depends on the climate; where heavy dews fall or



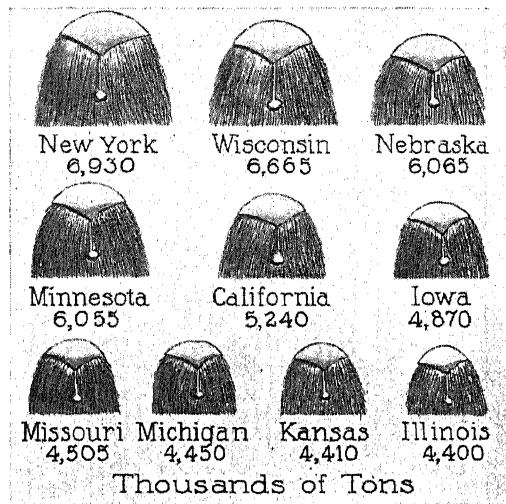
Photo: O. R. C.

## STATUE IN SALEM, MASS.

In that city is the House of the Seven Gables, which gave the name to one of Hawthorne's books.

rain is expected, the hay is collected each evening into mounds or haycocks. If it is very damp, it may be spread out again in the morning. The operations of cutting, raking, and stacking are now generally performed by machinery. Hay is often stacked out-of-doors, the stack being covered with a thick thatch of straw, arranged in the shape of a cone, to keep out the rain. More frequently, it is put into hay barns or lofts.

Fresh cut hay should not be fed to horses or cattle, as it is too relaxing. It is better kept in the stack until it has undergone a sweating process and has cooled again. If stored too green, the sweating is liable to generate such heat that the hay becomes scorched and useless. Hay may be fed whole or cut up and mixed in a feed ration. It is an excellent winter feed. For hard-worked horses, chopped hay with added meal is good, but no farm stock should be fed entirely on hay, whether from grass, alfalfa, or cereals; some grain food is always necessary. Hay made from clover and alfalfa is



WHERE MOST OF THE HAY IS PRODUCED  
The figures represent the average tonnage over a three-year period.  
rich in strength-building protein, and is much more nutritious than timothy or Kentucky blue-grass hay. For shipping purposes, hay is

baled by machinery and is readily handled. It requires less than one-third the space needed for loose hay.

B.M.D.

**Related Subjects.** The reader is referred in these volumes to the following articles:

Alfalfa  
Clover

Grasses (with list)  
Meliilot

**HAY, JOHN** (1838-1905). The first entrance of the United States into world affairs was under the leadership of John Hay. In 1899 the powerful nations of Europe were disputing as to their relative spheres of influence in China, and there was danger that the Chinese Empire might be dismembered. Hay, then Secretary of State, carried on negotiations with the various powers which resulted in an agreement to respect the integrity of the empire and to refrain from any acts of encroachment. This was called the "open-door" policy in China, and it was a credit not only to its author, but to the country he so ably represented.

John Hay was born at Salem, Ind., of Scottish ancestry. He was graduated at Brown University in 1858, and was admitted to the bar at Springfield, Ill., in 1861. He became acquainted with Abraham Lincoln, and when the latter was elected President, was made his assistant private secretary and aid-de-camp. He served in this capacity until Lincoln's death, after which he entered the diplomatic service of his country; between 1865 and 1870 he acted as secretary of the legations at Paris, Vienna, and Madrid. In 1870 he became an editorial writer on the New York *Tribune*, Horace Greeley's famous newspaper, and for several years he engaged chiefly in literary work. In 1897 he accepted an appointment by President McKinley as ambassador to Great Britain. Hay's service in London showed such insight and skill that his reputation as a diplomat was greatly enhanced. In 1898 he was appointed Secretary of State, and his conduct of the foreign affairs of the nation brought distinction to himself and honor to his country. He remained in this position until his death, in 1905.

The work of Hay in harmonizing the relations of the United States with other powers can scarcely be overestimated. The treaties which he negotiated, more than fifty in all, dealt with such important subjects as the Panama Canal (see HAY-PAUNCEFOTE TREATY),

the Venezuela dispute, the Philippine policy, the Alaskan boundary, and reciprocity treaties with both European and South American governments. He was also influential in re-establishing the international arbitration court at The Hague. See OPEN DOOR.

**As a Writer.** Hay's close association with President Lincoln inspired him to record his impressions of the Great Emancipator. His masterly biography, entitled *Abraham Lincoln: A History*, was issued in nine volumes in 1890. It was written with the aid of John G. Nicolay, and was at once recognized as an authoritative biography. He also wrote *Pike County Ballads*, *Castilian Days*, and several volumes of essays.

**HAY-BOX.** See FIRELESS COOKER.

**HAY-CHAMBERLAIN ACT.** See ARMY (United States).

**HAYDN**, *ha' d'n*, in German, *hi' d'n*, JOSEF (1732-1809), an Austrian musical composer, famed as the first great master to use the symphony form afterward perfected by Mozart and Beethoven. The character of his music, in the simplicity of its beauty, its hopefulness, and its geniality, is a reflection of his own temperament. To the children of his day, he was lovingly known as "Papa Haydn."

Haydn was born at Rohrau, Austria. He first gained recognition at the age of eight as choir boy at Saint Stephen's Church, Vienna, and later became a popular music teacher in that city. From 1760 to 1790 he was musical director to Prince

Esterhazy, and many of his best symphonies, several operas, much church music, and a large amount of chamber music of every description were the outcome of his activity during this time. He was the first to declare his confidence in Mozart's powers, and the two became warm friends. In 1791 and 1794 Haydn visited England, where he brought out his *Twelve Grand Symphonies*. Upon his return to Austria, he composed his oratorios, the *Creation* and the *Seasons*. The *Creation* contains music of much beauty and power, and the orchestral treatment of many of its passages may be regarded as the foundation of modern descriptive music.

The principle upon which he based his compositions is stated as follows—

Melody is the charm of music, and the invention of a fine air is the work of a genius.

This principle guided him in the creation of 125 symphonies, eighty-three quartets, thirty-eight

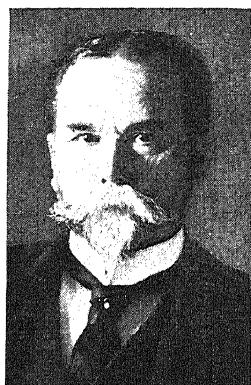


Photo: Brown Bros.  
JOHN HAY

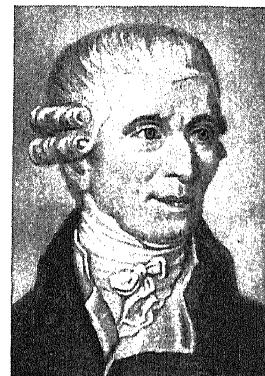


Photo: Brown Bros.

HAYDN

trios, eight oratorios, fourteen operas, twenty-four concertos for different instruments, and his many songs. Even this impressive list does



Photo: Beemn

HOME IN VIENNA

It was here that Haydn composed many of the symphonies and oratorios for which a music-loving world holds him in grateful remembrance.

not include all his work, for not all was published; one composition hitherto unknown was discovered in 1913.

**HAYES, PATRICK JOSEPH** (1867- ), an American cardinal of the Roman Catholic Church, raised to that great dignity in March, 1924. He was born in New York City, educated at De la Salle Academy and Manhattan College, and after graduation from the latter, began his ecclesiastical education at Saint Joseph's Seminary, Troy, N. Y. He continued his theological studies at the Catholic University of America, and was ordained a priest in the year 1892.

Father Hayes' first parish work was at Saint Gabriel's church, New York, under the late Cardinal, then Monsignor, Farley. When the latter became auxiliary bishop of New York, he named the young priest as his secretary, and in this capacity he served from 1895 to 1914.

In addition, he became chancellor of the diocese in 1903, and the same year was chosen first president of Cathedral College. In 1907 he was made a domestic prelate, with the title monsignor. In 1914, while on a trip to Rome, Cardinal Farley asked the Pope to make Monsignor Hayes his auxiliary bishop. The request was granted, and he was constituted titular bishop of Tagaste. Appointed pastor of Saint Stephen's Church in 1915, he continued in that capacity until the death of Cardinal Farley, whom he succeeded as archbishop of New York. See CARDINAL.

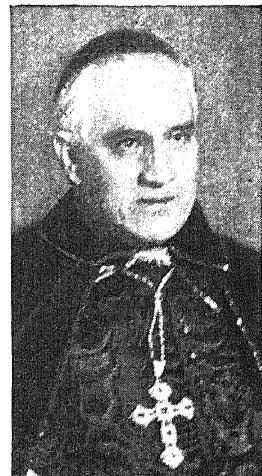
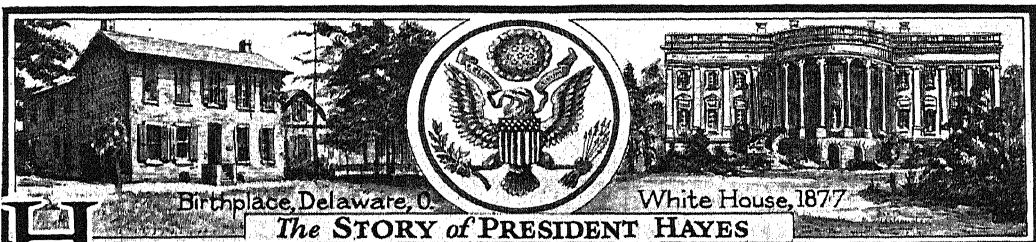


Photo: U &amp; U

CARDINAL HAYES



**H**AYES, RUTHERFORD BIRCHARD (1822-1893), an American soldier and statesman, the nineteenth President of the United States. After four years of distinguished service in the War of Secession, Hayes served several terms as Representative in Congress and as governor of Ohio, and was then President from 1877 to 1881. He owed his election to his conservatism;

he was acceptable to a people who felt there had been laxness in the government. His administration was noteworthy chiefly for the end of reconstruction in the South, for the resumption of specie payments, and for the Bland-Allison Silver Purchase Act.

In a wider sense, however, the administration is notable for the achievements of Hayes him-

self. Throughout his term he was constantly handicapped and attacked by an opposing element in his own party, and it was only by the aid of Democratic votes that the reforms he advocated were obtained. Hayes deserves to rank as a great builder; if the President did not

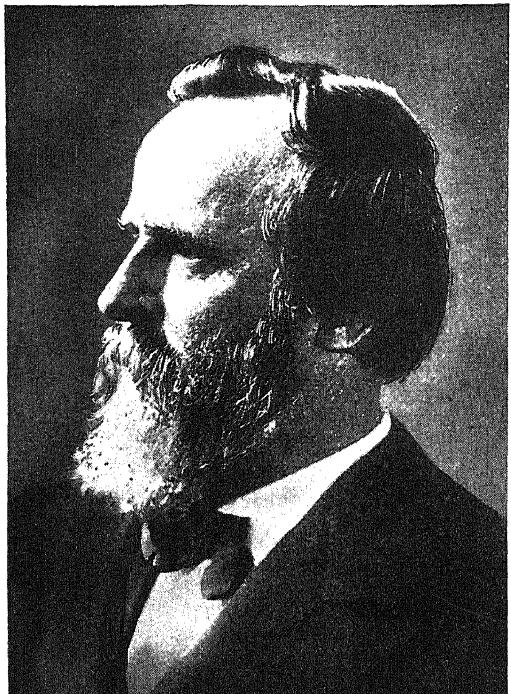


Photo: U &amp; U

RUTHERFORD B. HAYES

Lawyer, major general in the Union army in the War of Secession, governor of Ohio, and nineteenth President of the United States.

always obtain what he wanted, many times he laid a foundation on which his successors could build. Hayes had the advantage of a good education and a variety of interests which gave him a broad, sane outlook on the political and economic problems of the day. If his character and his career are to be summed up in a phrase, they cannot be called brilliant, but they were sound and distinguished.

Rutherford Birchard Hayes was born at Delaware, O., on October 4, 1822. His father, also named Rutherford, died in the July preceding his son's birth, leaving his widow in modest but not straitened circumstances. The boy received his primary education in the public school, but at an early age also studied Latin and Greek under a tutor. After further preparation at private academies, he entered Kenyon College in 1838, and was graduated four years later at the head of his class. The studies in which he excelled furnish a key to his character, already strongly marked; they were logic, mental and moral philosophy, and mathematics.

He then spent nearly two years studying in the office of a Columbus (Ohio) lawyer, and completed his law studies in the Harvard Law School, from which he was graduated in 1845. Until the War of Secession he practiced law in Ohio, first at Marietta, later at Fremont, and finally at Cincinnati. In the earlier years of his practice, when cases were few, he systematically continued his studies not only in law but in literature, and in Cincinnati he was chosen a member of the famous literary club of which Salmon P. Chase, later Chief Justice of the United States, was then a leading member. Hayes' practice increased steadily; he attracted public notice as attorney in several criminal trials, and from 1858 to 1861, he was city solicitor of Cincinnati.

**In the Army.** When the news of the bombardment of Fort Sumter reached Cincinnati, a great mass meeting was held in that city to express the sentiments of the people loyal to the Union, and Hayes was chairman of the committee which drew up the resolutions. The literary club of which Hayes was a member formed a military company, and Hayes was elected its captain. Before the end of 1861, he had been promoted to the rank of lieutenant colonel, had seen service in West Virginia, and been judge advocate of the Department of Ohio. In August, 1862, he was offered the colonelcy of the Seventy-ninth Ohio Regiment, but preferred to remain as lieutenant colonel of his old regiment, the Twenty-third Ohio, which was then a part of the Army of the Potomac. At the Battle of South Mountain, the Twenty-third Ohio lost nearly half of its men. Hayes himself was wounded, but led his men until he had to be carried from the battlefield.

On his recovery from his wound, he was appointed colonel of his regiment, and thereafter was conspicuous in several important expeditions, notably one which he led into Ohio to cut off the retreat of General John Morgan and his raiders. In the spring of 1864, in the expedition which cut the lines of communication on the Virginia and Tennessee Railroad between Richmond and the southwest, Hayes commanded a brigade; he led the principal charge on the enemy's works with conspicuous boldness. In the Shenandoah campaign, his brigade was a part of General Sheridan's army, and he himself won praise.

At the second Battle of Winchester, on September 19, 1864, he performed a daring feat. He was leading an assault against a battery standing on a slight rise of ground, when he ran into a swamp about 150 feet wide. His horse was caught in the mire, but Hayes dismounted and waded on alone. When he reached dry land, he turned and called to his men to follow him. About forty of them crossed the bog and seized the battery after a hand-to-hand fight.

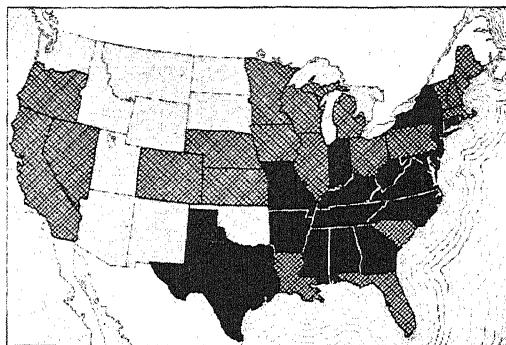
A week later, at Fisher's Hill, he routed the enemy by a brilliant flank attack under great difficulties, and at Cedar Creek his bravery was so outstanding that General Crook, his commander, approached him after the battle and said, "Colonel, from this day you will be a brigadier general." On March 13, 1865, he was further rewarded by the rank of brevet major general. Grant, in his *Personal Memoirs*, written twenty years later, said of Hayes that "his conduct on the field was marked by conspicuous gallantry, as well as the display of qualities of a higher order than mere personal daring."

**Representative in Congress and Governor of Ohio.** Hayes does not rank as one of the great commanders in the War of Secession; as a military strategist, he is not to be compared with Grant, Lee, or Sherman. He was, however, a man who won popularity and devotion from his followers. The Ohio soldiers in the army almost unanimously made him their choice for governor of Ohio in 1864, and in August of the same year he was given the Republican nomination as Representative in Congress from the Second Ohio district. At this time Hayes was in active military service, and when a friend suggested to him that he ought to ask leave of absence in order to campaign for the seat in Congress, he made the famous reply, "An officer fit for duty who at this crisis would abandon his post to electioneer for a seat in Congress ought to be scalped." He was elected without any effort on his part, took his seat in the House in December, 1865, and was re-elected in the next year.

He had served only his first term when the Ohio Republicans nominated him for governor of the state. Some idea of his personal popularity may be gained from the fact that he was elected, although the negro-suffrage amendment to the state constitution, the issue on which he made his campaign, was defeated by 50,000 votes. The Democrats carried the legislature, which promptly elected as United States Senator Allen G. Thurman, Hayes' recent opponent for governor. Two years later, Hayes was again elected by a substantial majority over George H. Pendleton. During these four years in the governor's chair, his record was excellent, and his reputation as an advocate of civil service and prison reform and of sound money was more than local.

At the close of his second term, Hayes was fully determined to retire to private life. He refused to be a candidate for United States Senator, although his election would have been almost certain. After much urging, he was a reluctant candidate for Representative in Congress in the summer of 1872, but was defeated. In 1875, in spite of his repeated statement that neither his interests nor his tastes would allow him to re-enter public life, he was nominated for governor by the Republicans. Governor

William Allen was the Democratic candidate for re-election, on a platform remarkable for the number of national issues inserted in it. The Republicans in Ohio were by no means united on the questions at issue, but Hayes won in a campaign which attracted the attention of the nation. He was then one of the foremost advocates of "honest money," one of the campaign issues, and was at once recognized as the Ohio candidate for the next Republican nomination



ELECTION OF 1876

The cross-shaded states gave their electoral votes to Hayes; those in black voted for Tilden. The light, unshaded areas were nonvoting territories.

for President. In the national convention, held at Cincinnati in June, 1876, the leading candidates were James G. Blaine, Oliver P. Morton, Benjamin H. Bristow, and Roscoe Conkling. Hayes received only sixty-one votes on the first ballot, but his strength gradually increased until he was nominated on the seventh ballot.

**The Election of 1876.** The Democratic candidate for President was Samuel J. Tilden, who had been instrumental in breaking up the Tweed Ring, and had later made an excellent record as reform governor of New York. A third party, the Greenback, nominated Peter Cooper for President, and made its first appearance as a national political party. Both Hayes and Tilden were men of high character, and there was little to choose between them. The election was very close, Hayes receiving a popular vote of 4,033,950 to 4,284,885 for Tilden. On the face of the returns, Hayes received 185 electoral votes to 184 for Tilden, but both parties charged that frauds had been practiced. The Democrats claimed to have carried Louisiana, Florida, and South Carolina, but the Republican canvassing boards and governors certified the Republican electors. The disputes grew very bitter, and at one time it seemed as if the control of the government might be taken by force. The issues were finally submitted to a special Electoral Commission, which decided every dispute in favor of Hayes by a strictly partisan vote, eight Republicans to seven Democrats. On March 2, 1877, two days before

the inauguration, Hayes was declared duly elected by an electoral vote of 185 to 184.

Throughout the trying months from November to March, when the country was almost on the verge of another internal conflict, both Hayes and Tilden conducted themselves with notable calm and dignity. Hayes' attitude was shown in a letter to John Sherman: "You feel, I am sure, as I do about this whole business. A fair election would have given us about forty electoral votes at the South—at least that many. But we are not to allow our friends to defeat one outrage and fraud by another. There must be nothing crooked on our part." It is only justice to Tilden to say that he expressed himself in similar fashion.

**Hayes' Administration (1877-1881).** Hayes appointed a strong Cabinet, including William M. Evarts as Secretary of State, John Sherman as Secretary of the Treasury, Carl Schurz as Secretary of the Interior, and David M. Key as Postmaster-General. The appointment of Key, who had been a Confederate officer, indicated the conciliatory attitude of the administration toward the South. Only twelve years had elapsed since the end of the War of Secession, and already a Federal general summoned a Confederate officer to aid him in the government of a reunited nation.

**End of Reconstruction.** In South Carolina and Louisiana, there were two sets of state officers and two legislatures, one Republican and one Democratic, each claiming to have received a majority of the popular vote. In both states the Republican officers were in possession of the state house and the government records, but only through the support of Federal troops. Most of the influential white citizens had given their support to the Democratic candidates. President Hayes had already made up his mind that the use of United States troops to maintain one faction in the South against another must come to an end, and when he had received assurances from Southern leaders that they would use their influence for the maintenance of order and the rights of all classes of citizens, he ordered the withdrawal of the troops in April, 1877. With the withdrawal of the soldiers, the "carpetbag" governments inevitably came to an end, and the government of the South again passed into the hands of its native citizens.

**Negro Exodus.** The end of reconstruction was at least partly responsible for the movement of large numbers of negroes from the South to Northern and Western states. The movement began early in 1879 and continued in full force for over a year. Over 40,000 negroes settled in Kansas alone, and large numbers also went to Indiana and Missouri. The explanations given for this movement by the negroes were that they were asked to pay exorbitant rents and prices in the South, and

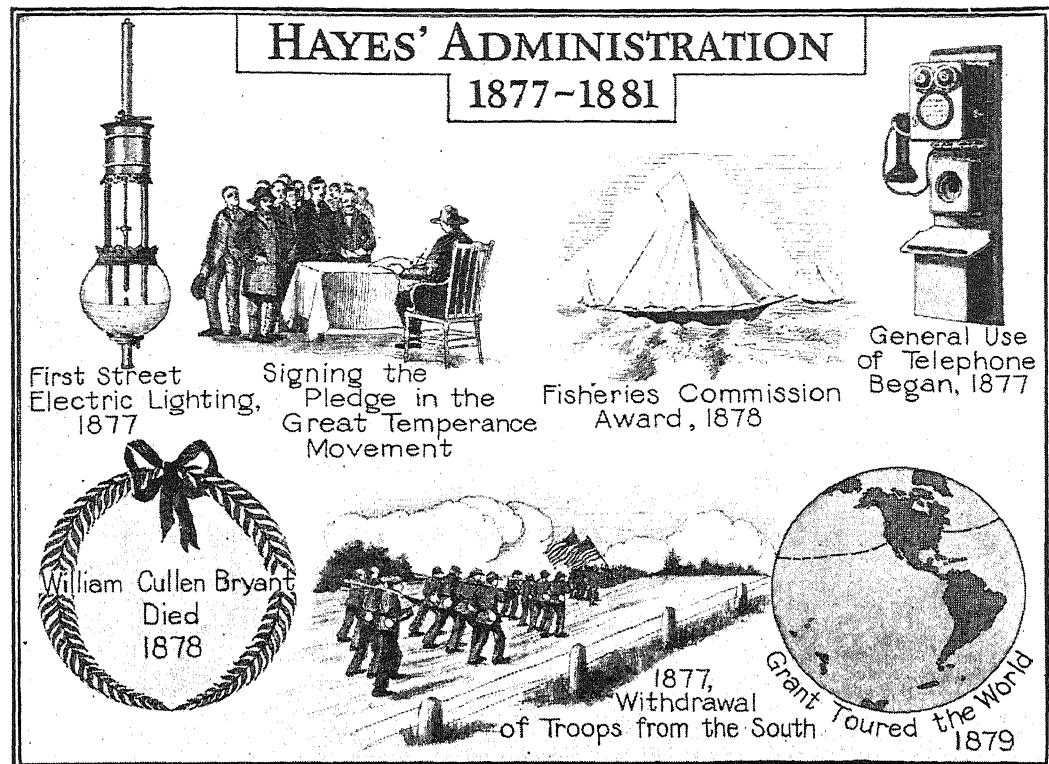
that they were kept at an economic and political disadvantage. Whatever the reasons may have been, most of the negroes were poor and reached their destinations half-starved, penniless, and without promise of work; it was only through the generosity of many Northerners that hundreds were saved from starvation.

**Labor Troubles.** The panic of 1873, at the beginning of Grant's second term, was followed by a period of financial and economic depression, during which thousands of laboring men were out of work or were earning less than their former wages. Laborers were discontented, and gave expression to their feelings by frequent strikes, the most serious of which was the railroad strike of 1877. It began on the Baltimore & Ohio Railroad, spread to the Pennsylvania System, and affected practically every line east of Chicago and north of the Ohio River. At one time about 100,000 men were on strike. Thousands of dollars' worth of property was destroyed, about 100 lives were lost, and Federal troops were sent to Pennsylvania, Maryland, and Illinois to preserve order.

There were serious strikes of miners in West Virginia, where Federal soldiers were again needed to preserve the peace. It was also in that year, 1877, that the power of the Molly Maguires was finally broken. This was a secret organization, formed in the Pennsylvania coal regions about 1854; after some years it became so powerful that it did not stop at murder to gain its ends. It brought about a great strike among the coal miners in 1875, and for two years its members dominated the councils of the miners. The mine owners bitterly opposed it, and through their efforts it was broken up and several of its leaders were executed for murder. Equally typical of the discontent among laborers was the growing power of the Knights of Labor, and the farmers continued to express their opposition to capital through the Grange.

**Financial Legislation and Resumption of Specie Payments.** After the law of 1873 removed the silver dollar from the list of standard coins, gold was the only unlimited legal-tender metallic money in the United States. In January, 1878, Congress adopted a joint resolution making all bonds of the United States payable, at the option of the government, in silver dollars, and a month later it passed the Bland-Allison Act. This act did not restore the free and unlimited coinage of silver, but it required the Secretary of the Treasury to buy not less than \$2,000,000 or more than \$4,000,000 worth of silver bullion each month and coin it into dollars at once.

The President promptly vetoed the Bland-Allison Act because the enormous and increasing production of the Western mines was steadily driving the price of silver downward. At that time a silver dollar of  $41\frac{1}{2}$  grains, the



weight fixed by the act, would contain only ninety cents' worth of silver, and the price of silver was steadily declining. Hayes argued that it would be a breach of faith to pay the national debt in any coin worth less than that which had been received from the sale of bonds. Congress, however, did not agree with the President. Some members claimed that large purchases by the government would raise the price of silver; others said that the coinage of silver alone could satisfy the demand for more and cheaper money; and still others argued that a "cheap dollar," which cost the government only ninety cents, would lower taxation by enabling it to pay off the national debt in silver. For these reasons, Congress passed the bill over the President's veto.

During Grant's administration, Congress passed an act providing for the resumption of specie payments on January 1, 1879. The act was chiefly the work of John Sherman, whom Hayes appointed Secretary of the Treasury. No preparation for resumption had been made before Sherman took office, but in 1877 he began to accumulate a gold reserve in the Treasury. On January 1, 1879, the gold coin on hand was more than enough to redeem all the greenbacks likely to be presented. As soon as everybody knew that the paper money could be redeemed in gold, nobody was anxious to make the exchange.

*Civil Service.* President Hayes began his administration with earnest efforts for the reform of the civil service. In many branches competitive examinations for clerkships were instituted, and in all branches political influence was less useful than it ever had been before. The supposed right of Congressmen to dictate who should be the Federal office-holders in their states or districts was not recognized, although their advice was sometimes asked. The President's independent attitude found no favor among the politicians and most Congressmen. Congress refused to provide for the civil-service commission which Hayes requested, and several times refused to confirm the President's appointments of able men. The most important controversy over civil service concerned the New York customhouse. Hayes removed the collector of customs, Chester A. Arthur, and the naval officer, Alonzo B. Cornell, because the customhouse was "used to manage and control political affairs," and because Arthur and Cornell refused to reform it.

*Other Events.* The foreign relations of the government during the Hayes administration were lacking in startling incidents. Congress passed a law in 1879 prohibiting Chinese immigration, which Hayes vetoed because it violated a treaty obligation. The only other noteworthy event affecting foreign countries was the settle-

## OUTLINE AND QUESTIONS ON RUTHERFORD B. HAYES

### Outline

#### I. Years of Preparation

- (1) Birth and parentage
- (2) Education
- (3) Legal practice

#### II. Military and Political Career

- (1) At South Mountain
- (2) In the Shenandoah campaign
  - (a) Personal daring
- (3) Promotion
- (4) As representative in Congress
- (5) As governor of Ohio
  - (a) His excellent record
  - (b) Advocacy of "honest money"
- (6) Presidential election of 1876
  - (a) Charges of fraud
  - (b) Choice of Hayes by Electoral Commission

#### III. His Administration

- (1) End of Reconstruction Era
  - (a) Disputed elections in Southern states
  - (b) Federal troops withdrawn
  - (c) Movement of negroes into Northern and Western states

#### (2) Labor troubles

- (a) Financial depression
- (b) Railroad strikes
- (c) Miners' strikes
  - i. The Molly Maguires
- (d) Knights of Labor
- (e) The Grange

#### (3) Financial reform

- (a) Resumption of specie payments
- (b) Bland-Allison Act
  - i. Passed over President's veto
- (4) Other important events
  - (a) Attempts at civil-service reform
  - (b) Chinese Exclusion Act
  - (c) Atlantic fisheries dispute settled
  - (d) Mississippi River improvements completed
  - (e) Life-saving service organized
- (5) Election of 1880
  - (a) Issues
  - (b) Candidates
  - (c) Result

#### IV. Later Years, and Character

- (1) Interest in reforms
- (2) Honors
- (3) Estimate of character

### Questions

What was the "negro exodus," and what caused it?

What great tribute did an ex-President pay to Hayes?

What was "carpetbag" government, and when was it discontinued?

Describe one act of great daring performed by Hayes.

What appointment made by Hayes showed that North and South were coming into closer accord?

What shows his attitude toward his own contested election?

Why was he not in favor of a Chinese Exclusion Act?

What brought about the disputes over the election of 1876? How were they settled?

Why did not Hayes approve of the Bland-Allison Act?

How did the youth of Hayes differ from that of Lincoln?

How many ballots were taken before Hayes was nominated for the Presidency?

Who were the Molly Maguires and what were their methods?

To what characteristic did Hayes really owe his election?

What showed his personal popularity at the time of his election to the governorship?

What bad effects did his Presidential administration feel of troubles in a former administration?

For what social policy, as mistress of the White House, is Mrs. Hayes well remembered?

ment of the Atlantic fisheries dispute. Of great importance to the Mississippi Valley was the completion of the improvements at the mouth of the Mississippi River, in accordance with the plans of Captain James B. Eads. The lower Mississippi Valley, and in fact the entire South, was swept by an epidemic of yellow fever in 1878 and 1879. The latter year was also noteworthy for the organization of the United States life-saving service. Hayes had announced, in 1876, that he would not, under any circumstances, accept reelection to the Presidency. In the election of 1880, the Republican candidate, James A. Garfield, was elected over General Winfield S. Hancock.

**An Active Ex-President.** Hayes was only fifty-nine years old at the end of his term, and his retirement from public office gave him leisure to devote to reforms and charities in which he was interested. He was for a number of years president of the trustees of the John F. Slater Fund for the promotion of industrial education among the negroes in the South, and was also one of the trustees of the Peabody Educational Fund. He was an active member of the National Conference of Charities and Corrections, served a term as president of the National Prison Association, was a trustee of Western Reserve University, of Ohio Wesleyan University, and of several other charitable and educational institutions. He was senior vice-commander of the Loyal Legion, but of all the honors given him, he was perhaps proudest of the presidency of the Twenty-third Regiment Ohio Volunteers' Association, the regiment which was always his regiment. He died at his home at Fremont, O., on January 17, 1893.

E.D.F.

**Lucy Webb Hayes** (1831-1889), the daughter of Dr. James Webb, was one of the most popular "First Ladies" the country has known. She was the first President's wife who was a college graduate, for university training for women was first being attempted when she attended Wesleyan Female College in Cincinnati. She was essentially a modern woman, the first White House mistress to add a keen interest in public questions to her concern in her home, family, and society. She was identified with the temperance movement throughout her life.

In her official positions, Mrs. Hayes was active in charitable work, as well as in the care of her children and home. Both she and President Hayes were fond of society, and the official and private life of the



Photo: U &amp; U

LUCY WEBB HAYES

family was eventful and happy. Their tastes were simple, and their lives deeply religious. Mrs. Hayes abolished the custom of serving wine in the White House.

Five of the eight Hayes children lived to see their father made President. Mrs. Hayes died in 1889, four years before her husband's death. Rutherford P. Hayes, the third son, died in 1927.

A White House wedding in 1878 united General Russell Hastings and Miss Emily Platt, a niece of the President.

**Related Subjects.** The reader who wishes additional information regarding events connected with the life and times of this President is referred in these volumes to the following articles:

Carpetbaggers  
Chinese Exclusion  
Electoral Commission

Grange  
Greenback Party  
Reconstruction

**HAY FEVER, OR HAY ASTHMA,** *az' muh, or as' muh*, a very disagreeable affection of the mucous membranes of the eyes, nose, mouth, and bronchi, accompanied sometimes by asthma and fever. It is characterized by frequent paroxysms of sneezing and by a copious watery flow from the nose and eyes. The attacks occur in the late summer months and are caused, in persons susceptible to the disease, by the pollen of various plants. Ragweed, English plantain, and various other grasses cause hay fever, but the goldenrod no longer is believed to be an offender.

Removal to a locality where the pollen-producing plants do not grow is a sure method of avoiding hay fever, but such removal is not always possible. Physicians are attempting to prevent attacks in susceptible persons by injecting preparations of proteins obtained from the pollens at fault. Some obtain relief by inhaling steam medicated with creosote; by spraying the nasal membranes with a solution of menthol and camphor (four grains each, in an ounce of liquid petrolatum); or by irrigating the nostrils with salt and soda dissolved in warm water. See ASTHMA.

**HAY-HERRAN TREATY.** See COLOMBIA (Government).

**HAYMARKET RIOT.** See CHICAGO (History).

**HAYNE, hain, PAUL HAMILTON** (1831-1886), an American poet, popularly known as "the laureate of the South." There are other Southern poets, notably Poe and Lanier, whose work has won wider recognition and who possessed a greater measure of genius, but Hayne deserved his title, for he succeeded in expressing much of the spirit of the South.

Hayne was born in Charleston, S. C., and grew up in the household of his uncle, Robert Young Hayne, famed for a brilliant debate with Daniel Webster on states' rights (see following article). He was educated at South Carolina College, and then studied law, but he was not obliged to earn his living and preferred to spend his time in literary pursuits, rather

than to practice his profession. Three volumes of his poems had appeared before the outbreak of the War of Secession, but that conflict saw the end of his pleasant, leisurely life. He served in the Confederate army, and during the struggle suffered financial ruin. In his later years and after his death, his cottage near Augusta, Ga., was the center of an affectionate public interest.

**Representative Writings.** Such poems as *In the Wheat-Field*, *Aspects of the Pines*, and *A Storm in the Distance* show his understanding of nature, while *The Bonny Brown Hand* and *A Little While I Fain Would Linger Yet* have a more personal touch.

**HAYNE, ROBERT YOUNG** (1791-1839), an American statesman whose name is inseparably connected with that of Daniel Webster, for he was the opponent of Webster in a remarkable debate on the subject of states' rights, which held the interest of the Senate from January 19 to 27, 1830. It attracted the attention of the world, and has remained an outstanding event in American history.

Hayne was born in Saint Paul's Parish, Colleton District, S. C., studied in private schools, and at the age of twenty-one was admitted to the bar. He enlisted in the War of 1812, and immediately on its close entered the South Carolina legislature. From 1818 to 1823 he was attorney-general of his state, and became increasingly popular by reason of his able and ardent advocacy of the principle of states' rights. Each state had made a compact with the Federal government, he argued, and if the latter was untrue to the agreement, as he felt it had been, a state had a right to refuse to recognize Federal laws. On this platform he was elected in 1823 to the United States Senate, where he speedily became known as one of the foremost states' rights champions. His part in the Webster-Hayne debate was a brilliant argument, worthy to rank with the reply of the eloquent Webster. The following is a characteristic passage from Hayne's contribution to the famous argument:

The people whom I represent, Mr. President, are the descendants of those who brought with them to this country, as the most precious of their possessions, "an ardent love of liberty"; and while that shall be preserved, they will always be found manfully struggling against the consolidation of the government as the worst of evils.

Who, then, Mr. President, are the true friends of the Union? Those who would confine the Federal government strictly within the limits prescribed by the Constitution; who would preserve to the states and the people all powers not expressly delegated; who would make this a Federal and not a National Union, and who, administering the government in a spirit of equal justice, would make it a blessing and not a curse.

When South Carolina put into practice his theories by declaring certain Federal laws null

and void, Hayne supported his state in the controversy which ensued, and in 1832 resigned from the Senate and became governor of South Carolina. During his two years in this office, he remained true to his states' rights and nullification principles, but showed himself a moderate man as well, more than once using his influence to prevent outbreaks. His last public service was rendered as mayor of Charleston, 1835 to 1837.

**Related Subjects.** The reader is referred in these volumes to the following articles:

Nullification      States' Rights      Webster, Daniel

**HAYNES, ELWOOD** (1857-1925). Among the many interesting exhibits in the Smithsonian Institution, Washington, D. C., is a "horseless carriage" which bears this label: "Gasoline automobile built by Elwood Haynes in Kokomo, Indiana. Successful trips made at a speed of six or seven miles an hour, July 4, 1894." This odd-looking vehicle is credited by engineers with being the first successful automobile, and doubtless the fame of its inventor will rest chiefly upon this fact. Yet Haynes was not only a mechanical genius; he was a scientist who made many valuable contributions to the world in the field of metallic alloys.

He was born in Portland, Ind., and received his early education in the public schools of that place. In 1881 he was graduated at Worcester Polytechnic Institute, and afterward pursued scientific courses at Johns Hopkins University. From 1886 to 1901, he was manager of the Portland National Gas and Oil Company. It was in 1898 that the Haynes Automobile Company was organized at Kokomo, with Haynes as president.

During these years of business activity, he continued his scientific researches. In 1881 he discovered the means of producing tungsten chrome steel, and in 1897 the method of alloying chromium and nickel. He was the first to use aluminum in the construction of automobile engines, and in 1900 he invented an alloy for cutting instruments. To these inventions he added stainless steel, or "stellite," which was largely used for lathe tools in turning out big guns during the World War. This material is so hard that it retains its cutting edge even when it is red-hot. Owing to this property, the speed at which guns could be produced was greatly increased.

It was in 1893-1894 that Haynes built his first automobile. It was equipped with a one-cylinder, marine-type gasoline engine capable of developing one horse power. From this meager beginning, has emerged an industry which ranks first in the value of its output among all those of the United States.

Haynes was an advocate of the metric system, and favored its general adoption in place of the traditional systems of measure-

ment. He was a member of the Indiana State Board of Education, a trustee of Western College, Oxford, O., and a member of the International Congress of Applied Chemistry. See AUTOMOBILE for illustration of the first Haynes car.

**E.U.G.** **HAY-PAUNCEFOTE**, *pawns'foot*, TREATY, an agreement between Great Britain and the United States, abrogating the Clayton-Bulwer Treaty (which see), and defining the latter country's policy regarding a canal to be built across the isthmus connecting North and South America. It was drawn up by John Hay, Secretary of State, and Sir Julian Pauncefote, English ambassador, November 18, 1901, and provided that such a canal should be constructed by, or under the direction of, the United States; that no nation was to be asked to guarantee neutrality; and that in war times the United States was to be given undefined rights of control, including the closing of the canal, and the erection of forts commanding the canal and adjoining waters. Furthermore, all nations were to enjoy equal rights and benefits from the canal, and any change in the sovereignty of the territory through which it extended was not to influence the principles of neutrality.

Therefore, when Congress passed the Panama Canal Act in 1912, which provided that American vessels engaged in domestic commerce should be free from the tolls paid by other boats, Great Britain objected, saying that it violated the provision for equal rights to all nations, and suggested that the question be settled by arbitration. No action was taken on the latter point, but in 1914, in spite of great opposition in Congress, a bill was passed repealing the disputed provision of the Panama Canal Act, for it was President Wilson's belief that the nation's honor depended upon the strict observance of the treaty. See PANAMA CANAL (Canal Tolls).

**HAY RIVER.** See illustration, Alexandra Falls, on page 1125.

**HAYS, CHARLES MELVILLE** (1856-1912), an American citizen who became a great Canadian railway executive. He was born in Rock Island, Ill., but from his long connection with the Grand Trunk Railway, was always regarded as a Canadian. He began railroading when he was seventeen, and rose rapidly, becoming general manager of the Wabash Railway when he was only thirty years old. In 1897 he accepted the position of general manager of the Grand Trunk at Montreal. During his four years there, he reorganized the Central Vermont Railway Company, a subsidiary of the Grand Trunk, and double-tracked the line of the Grand Trunk from Montreal to Chicago. He became president of the Southern Pacific in 1901, but the same year was recalled to Montreal to become second

vice-president and general manager of the Grand Trunk. Largely due to his efforts, the Grand Trunk Pacific Railway Company, of which he was president, was organized. On January 1, 1910, he became president of the Grand Trunk Railway Company. While returning from a trip to England, where he had made arrangements with the directors for further expansion, he perished in the *Titanic* disaster, on April 15, 1912.

**HAYS, WILL H.** (1879- ). Because of the size and importance of the motion-picture industry and the influence of the pictures on the public taste, particularly of young people, a sentiment began to manifest itself shortly after the World War for some sort of public regulation. Before this assumed definite form, the leading producers created an organization and selected a director who should exercise general supervision over the content and treatment of all picture material. This director was Will H. Hays, lawyer and politician of Indiana, who at that time (1922) was serving as Postmaster-General in the cabinet of President Harding (see MOVING PICTURES).

Mr. Hays was born at Sullivan, Ind., and was graduated at Wabash College in 1900. He entered at once upon the practice of law and took an active interest in public affairs. He was chairman of the Indiana Republican Committee, 1914-1918; chairman of the Indiana State Council of Defense, 1917-1918; and chairman of the National Republican Committee, 1918-1921. In 1921 he was appointed Postmaster-General, but resigned, a year later, to accept the presidency of Motion Picture Producers and Distributors of America, Inc.

Mr. Hays is a prominent participant in social and religious work. He is director or trustee in many organizations whose object is social welfare, such as the Boy Scouts, Salvation Army, American Red Cross, Institute for Crippled and Disabled Men, National Institute of Social Science, and the Academy of Political Science.

In 1923 he was made chairman of the laymen's committee of the Presbyterian Board of Ministerial Relief and Sustentation, and largely aided in creating an adequate fund for that organization.

He is a member of numerous social clubs and holds a colonel's commission in the Reserve Corps.

**HAYSTACK MOUNTAIN.** See ADIRONDACK MOUNTAINS.

**HAZARDS**, a golf term. See GOLF.

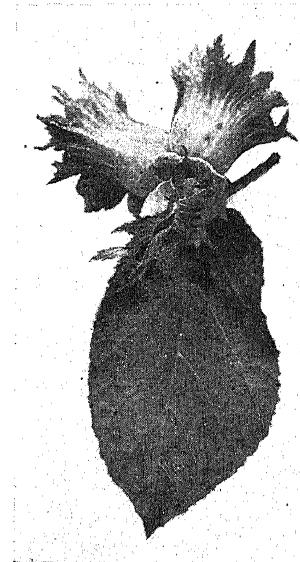
**HAZE**, the accumulation of extremely minute particles in the air which are individually invisible, but which, collectively, produce a fogginess of the atmosphere. Unlike fog, haze is often observed when the lower air is unusually dry. When the upper air is in the first stage of cloudiness, the particles comprising

haze are usually small drops of water, mixed with smoke or dust. This is termed water haze, and appears gray in reflected light. Extensive forest fires cause a smoke haze, which is dense blue in color and which travels many miles from the scene of the fire; sometimes the smoke from a great forest fire will darken the atmosphere perceptibly 500 miles distant. Volcanic eruptions also throw a fine dust into the air, producing coloration of the atmosphere which is observed for great distances. Haze is frequently observed during the autumn months, and makes an effective background for the changing foliage. See INDIAN SUMMER; DUST, ATMOSPHERIC.

R.H.W.

**HAZEL**, *ha' z'l*, the tree or shrub which produces the nut called the *filbert*. Most of the cultivated varieties are grown in Europe. The

best nuts come from Spain, but North America has two species of its own, which are widely distributed over the woodland. In the spring, when many trees are showing beautiful flowers, the hazel is not conspicuous, for its flowers



THE HAZEL NUT

Leaves and growing nut, in midsummer. At right (a), the ripened nut, after frost opens the bur.

are modest catkins; but in autumn, when the pointed, scalloped leaves turn a rich yellow, the hazel would be sadly missed from the woods. Nowhere do these trees grow very large, and the wood is of little value to the cabinet-maker; but baskets, crates, whip handles, hoops, and such articles are made from the strong, flexible rods.

From time immemorial, it has been thought that a forked hazel twig possesses marvelous powers. Biblical writers, ancient Roman writers, and writers in all countries of Europe since those early days have mentioned the use of hazel rods as a means of determining the presence of precious minerals or water below the earth's surface, and in many rural communi-

ties the old belief still persists. It is the real hazel which is used for this purpose in England, but in North America a different shrub has been christened *witch-hazel* (which see) because of its supposed magic powers.

The nuts from the American hazels, which grow wild, have no especial value, save as they delight the children on crisp autumn days, but there is a large commerce in the cultivated nuts of Europe. Hazel nuts yield a valuable oil, much used by perfumers and by painters.

B.M.D.

**Scientific Names.** The hazels belong to the birch family, *Betulaceae*. They constitute the genus *Corylus*. The common hazel of Europe is *C. avellana*.

**HAZEN, WILLIAM B.** See SIGNAL CORPS.

**HAZING**, the infliction by upper-class college students of severe "practical jokes" upon underclassmen, which often involve bodily harm. The term also includes any humiliating action entailing the abandonment of self-respect and dignity, performed by a person through fear or threat. The excuse for hazing in colleges is that it "restrains the ambitions of new students which would otherwise render college life intolerable to the older undergraduates." The hazed one's consolation is the prospect of inflicting similar indignities on others when he himself is an upper classman.

Hazing has resulted disastrously in many instances; students have died from the effects of the pranks played upon them, and some cases of insanity have developed from fright experienced by the victims. School officials, within recent years, have placed heavy penalties, usually expulsion, upon participants. The practice has been entirely abandoned in almost all colleges and universities. In the military and naval schools of practically all governments, hazing is forbidden, and very severe penalties are imposed for violation of the rule.

**HAZLETON, PA.** See PENNSYLVANIA (back of map).

**HAZLITT, WILLIAM** (1778-1830), one of the greatest of English essayists and critics. He wrote of nature and of art and the characters of men; as a critic of the drama, few equaled him. He was one of the most successful controversialists and a master of epigram and sarcasm. Born at Maidstone, he started out to study for the ministry, but abandoned this for portrait-painting. Then he turned his at-

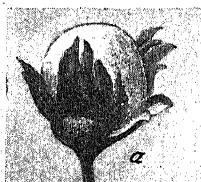


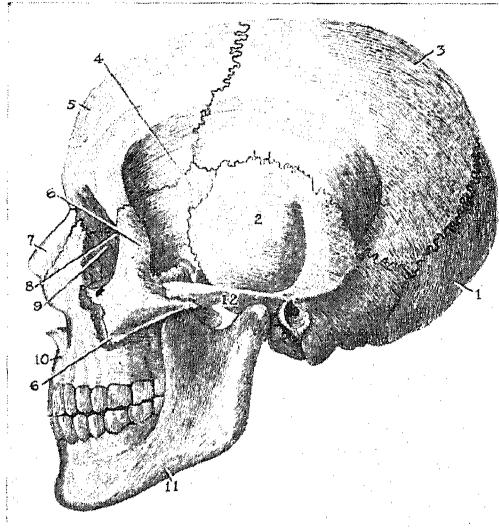
Photo: Brown Bros.

WILLIAM HAZLITT

tention to literature, his first publication of importance being an *Essay on the Principles of Human Action*.

**Representative Works.** Hazlitt's *Round Table*, a series of essays on literature, men, and manners; his *View of the Contemporary English Stage*; his *Lectures on the Poets*, *The English Comic Writers*, and *The Dramatic Literature of the Age of Elizabeth*; his *Characters of Shakespeare's Plays* and *Table Talk* sustain his reputation in the field of English letters. His autobiographical essays, however, are perhaps the most delightful of all his works; they exhibit a quiet humor and leisurely style.

**HEAD.** The head is the seat of the brain and the chief organs of special sense—the eyes, ears, nose, mouth, and tongue. It is the most



BONES OF THE HEAD

- |               |                         |
|---------------|-------------------------|
| (1) Occipital | (7) Nasal               |
| (2) Temporal  | (8) Ethmoid             |
| (3) Parietal  | (9) Lachrymal           |
| (4) Sphenoid  | (10) Superior Maxillary |
| (5) Frontal   | (11) Inferior Maxillary |
| (6) Malar     | (12) Zygomatic Arch     |

important part of the body. We often speak of the head as the mind. When we say that a man has a good head, we mean that he has a strong mind. The effect on the brain of an injury to the head is one of the evidences of the relationship between mind and body. A blow on the head, for example, by causing pressure on the brain, may produce impairment of the mind or even permanent insanity.

The chief parts of the head are the cranium, formed by the skull, and the face. The skull is formed by the union of eight bones, the frontal, two temporal, two parietal, the occipital, the sphenoid, and the ethmoid. The skull encloses and protects the brain, and its bones are formed of three layers—an outer and an inner layer, both hard and compact, and between these a porous layer which aids in pro-

tecting the brain from shocks in case of a fall or a blow.

The occipital bone rests upon the upper vertebra, with which it forms a joint that enables the head to turn in any direction. The greater part of the weight is in front of this point of support, and the head is held in an erect position by the muscles of the neck. If one falls asleep when in a sitting position, those muscles relax and the head falls forward. This is the explanation of the reason why a person nods when he is sleepy.

**Other Meanings.** The term *head* is often used to denote rank. We speak of one as being at the head of his class or at the head of a column. The term is also used to indicate leadership, as in the expressions, "the head of the house," or "the head man." K.A.E.

**Related Subjects.** The reader is referred in these volumes to the following articles:

|       |          |
|-------|----------|
| Brain | Mouth    |
| Ear   | Nose     |
| Eye   | Skeleton |
| Face  | Tongue   |

**HEADACHE**, an uncomfortable sensation, usually an aching but not a definite pain, located in the head. Associated with it there may be aching in the eyes, vertigo, dizziness, and nausea.

Headache is classed as a minor malady. Of itself it is not serious in the sense that it endangers life. In spite of this fact, it is one of the most important disorders to which mankind is subject. It ranks with the common cold as one of the two great causes of human misery and incapacity. Great battles have been lost and the course of empires changed, because at the moment when there was need for wise decision, the supreme authority was incapacitated by a headache.

The disorder has always afflicted man. Skulls of prehistoric peoples with trephine holes in them have been found. These holes through the bone were ground with stone implements, in order to let the evil spirits escape and in that way cure headaches.

There are many kinds of headaches and many causes of them. Migraine, known as sick headache, generally comes in periodic attacks. The attacks last from one to three days. They are characterized by nausea, sometimes by vomiting, sensitiveness to light, dizziness, and throbbing headache. Migraine affects women more often than men. It begins, as a rule, during late adolescence, and the attacks recur periodically until about the age of fifty, when they cease spontaneously.

Constipation headaches are generally cured by an enema and by watery purgatives. A light diet during the headache is advised. Eyestrain headaches result from wearing glasses that do not fit or from not wearing needed glasses, from working in glare or in a poor light, and from prolonged work that

strains the eyes. Headaches due to eyestrain are relieved by wearing properly fitted glasses or by otherwise relieving the strain.

Fatigue headaches result from overwork. The remedy is sleep and rest. Headache may result from hunger, or from acidosis due to eating a breakfast of tea and toast. Hunger headaches and acidosis headaches of the type mentioned are relieved by eating, say, a glass of milk and grapefruit, or a bowl of soup, or taking a cup of tea or coffee.

While one can get relief from headaches by taking a dose or two of aspirin, salicylic acid, phenacetin, antifibrin, or some other synthetic remedy, the plan is not to be commended. A search should be made to find the habit which is at fault, and to remedy it. In some instances, the fact that a given remedy has brought relief points to the cause. When aspirin or salicylic acid gives relief, the headache is of a rheumatic type.

Headaches are often symptoms of disease. For instance, the headache of the first stage of smallpox is very severe. Headache is severe in malarial fever and far less so in typhoid. Headache is symptomatic of meningitis. It may be a symptom of sinus infection, formerly called catarrh. It is present in the severer forms of high blood pressure and Bright's disease.

A tendency to headache coming on after fifty years of age suggests one or the other of these two diseases. Therefore the cause of headaches should always be investigated. The free use of headache cures induces the habit through provoking repetitions of the headache.

W.A.E.

[The diseases enumerated in this article are all described in their alphabetical positions in these volumes.]

**HEADER**, a form of harvester. See REAPING MACHINE.

**HEALTH**, *heilth*. In one of the *Fables* of an English poet, John Gay, may be read these lines:

Nor love, nor honor, wealth nor power,  
Can give the heart a cheerful hour  
When health is lost. Be timely wise;  
With health all taste of pleasure flies.

Certainly the poet did not overestimate the worth of one of the greatest blessings mortals can enjoy—health, which is the condition of physical well-being. The healthy person is one whose bodily functions are being performed easily and without pain. The physician says that anyone who sleeps well, and who can digest his food while satisfying a hearty appetite, may be considered in a good state of health. Under modern conditions, very few persons enjoy perfect health, but the observance of a few simple rules helps to keep one reasonably well.

**Related Subjects.** Standardized directions for securing and maintaining good health are given in the article

**HEALTH HABITS.** The reader is also referred to the index following that article, and to the lists following the articles ANATOMY; DISEASE, FOOD.

**HEALTH, BILL OF.** See BILL OF HEALTH.

**HEALTH, BOARD OF.** See BOARD OF HEALTH.

**HEALTH, PUBLIC.** See ANTISEPTICS; HYGIENE (Public Hygiene); EPIDEMIC; QUARANTINE; INOCULATION; SANITARY SCIENCE; SEWAGE AND SEWERAGE; BOARD OF HEALTH; BILL OF HEALTH.

**HEALTH HABITS.** Many of the physical difficulties of the school child are caused by the wrong sort of *habits*. Habit formation is the basis of character, and in much the same way is also the basis of health. When bad health habits are formed early in life, it is a very difficult matter to break them later, for they become an almost unconscious part of daily life (see, in this connection, HABITS IN CHILDHOOD, TROUBLESOME). On the other hand, sound health habits should be largely a matter of automatic action on our part. But good health habits can be acquired only through definite conscious action at first, and such action must be based on accurate knowledge. With this in view, let us consider how to form successfully the essential habits of health.

**Health-Habit Formation.** But comparatively few people enjoy good health most of the time. Professor Irving Fisher of Yale University has shown that at least one and one-half billion dollars are lost every year through the waste of preventable diseases, to say nothing of lost happiness and permanently reduced vigor. Much of this sickness is caused by the neglect in early life of sensible health-habit formation.

The formation of health habits is fairly easy when begun early, and includes comparatively few simple principles. For our present purpose, we may state the following as the most essential health habits:

- Food habits.
- Sleep habits.
- Mental habits.
- Exercise habits.
- Recreation habits.

**Food Habits.** While a whole volume might be written on food habits, yet the general principles of proper food, including correct eating, are rather simple and may be briefly stated.

First, *food must be clean*. By this we mean not only free from unwholesome foreign matter, but more particularly, free from parasites and germs of disease.

We must form the habit of demanding wholesome food; for example, meats free from tuberculosis germs and certain animal and vegetable parasites; milk from tuberculin-tested cattle, and handled in a sanitary manner from the time of milking to the time of con-

sumption; bakery goods from clean, sanitary bakeries, where not only the bakery itself, but all the employees, are clean and free from infection; vegetables and fruit from clean soil unpolluted with sewage, fertilizer, or infected water used in irrigation; the avoidance of water and ice from a polluted source, such as a sewage-infected river, lake, or well.

Every year thousands of infants are made sick from infected milk, and many of these die; every year thousands of children and adults suffer or die from infected water, ice, meat, vegetables, and other foods; yet the principles of avoiding infection through food are extremely simple. Such principles should become a part of our daily habits. Not only must food be clean and sanitary, but selected with reason in regard to quality, quantity, preparation, and variety.

Many people eat too much protein, which is found principally in lean meat, eggs, cheese, peas, beans, and lentils. Professor Chittenden of Yale has demonstrated that a high-protein diet is always harmful, while a low-protein diet reduces intestinal putrefaction, prevents undue fatigue, and increases endurance and general efficiency. But, in spite of this knowledge, too many menus contain an excess of protein food.

An excess of any one food element produces trouble. Many people suffer from "starch indigestion" because of the use of too much starchy food, such as cereals, bread, and potatoes. Some people suffer from the lack of sufficient water, of which the average person requires at least *six glasses per day*. Others eat much too sparingly of green vegetables and fresh fruits. Excessive use of coffee or tea is also undesirable.

*Sleep Habits.* Next in importance to food comes sleep. Sleep is a building-up process in which the waste of the day is repaired and energy stored up for future use.

Too little sleep results not only in conscious discomfort, but in greatly reduced efficiency. Attention has been called to the effect of loss of sleep on important organs, such as the thyroid, liver, and adrenal glands, and upon the cells of the brain. Long periods of loss of sleep or continued short periods produce permanent effects on our tissues, which rest never entirely effaces. Regular and sufficient hours of sleep should become fixed habits with everyone. Under stress and strain of emergencies, such habits will then stand us in good stead, for reserve energy will have been stored up, on which we can draw for some time without serious, if any, damage.

Most adults require eight hours of sleep. Children from six to ten years old require from ten to twelve hours. Older children usually need about ten hours. Of course the hours of sleep required depend largely upon the amount of energy used up in work, play, stress and strain of the day, and on natural

resistance; consequently, there will be many exceptions to any general rule.

*Mental Habits.* Nothing is more important in life than the formation of good mental habits. Very few people understand that there is any direct relation between mental habits and health, but, as a matter of fact, every thought, every emotion, every nervous impulse, directly affects the health of the whole body. Certain studies of anger, fear, mental exhaustion, worry, grief, hatred, and other emotions demonstrate that definite damage is done to such organs as the thyroid gland, the adrenals, the liver, and the brain, and that a number of diseases, as Bright's disease, neurasthenia, and apoplexy, may easily result.

Aside from any *moral* question involved, the control of the emotions is one of the most important matters that can concern us in life, for emotional uncontrol often leads directly to physical injury. Just as some diseases are at present quite out of our own control, so some emotions, such as grief, for example, are often unavoidable, but the greatest amount of control possible is in the highest sense desirable.

Emotional *debauches* are just as bad as any other kind of debauches.

Habits of cheerfulness, punctuality, and prudence must be formed in early life, if they are ever to be of much value to us. Moral habits of every kind formed at this period nearly always stay with us throughout life (see MENTAL CONFLICT, A CAUSE OF MISCONDUCT).

*Exercise.* Habit formation in exercise is fully as important as any other health habit. While it should be fairly evident that exercise increases bodily vigor by stimulating the circulation of blood to the various organs and tissues, removing waste products and repairing waste, it is not ordinarily recognized that physical training is also *mental* training.

Physical activity develops and coördinates the brain and muscular system. "In this way the great motor functions are organized in the brain and become a part of the physical basis of mind." Dr. James H. McBride has well expressed the value of physical strength in the following words:

The strong, confident person who has strength to spare, reserves of energy, does his work easily and without friction. Half the timidities and indecisions of men are chargeable less to lack of ability than to lack of the physical vigor, the *quantity* of energy, which is the driving power of character. In all the contests of life, an important element in success is the ability to endure prolonged stress, to have the reserve energy that can be drawn upon and utilized as a driving force. This power is not alone necessary in the emergencies, the "short hauls" of life, but also in the long hauls that spread the strain through greater periods. Many of the failures of life are due as much to lack of ability to meet prolonged stress as to lack of experience or intelligence. Men of moderate ability

but with great powers of endurance often succeed, while men of greater talent fail for lack of the ability to endure strain.

The man with a weak body and without the self-confidence that surplus energy gives is liable to be of uncertain judgment. Such a man, in the presence of a problem requiring quick decision, doubts and hesitates and stands shivering on the brink of action while hastening opportunities pass him by.

Much of the loose thinking of our time is undoubtedly due to poor educational drill. In fact, the failure of the schools to teach pupils how to apply the mind and how to think is one of their common approaches. Inability to use the mind effectively is also frequently due to a lack of vigor and physical stamina. A person with poor digestion, or under-developed body, or weak circulation, has of necessity a badly nourished brain. Such a brain, unless it belongs to a genius, will do poor thinking.

The mentally trained person who is also physically strong has the combination that puts his powers at easy command. He can be joyously busy doing the impossible because the doing of it has been made easy by training.

How much native power there is in all of us that for want of proper training or sympathetic encouragement never comes to maturity! How many of the finer qualities of character that, for want of a kindlier climate of cheerful companionship and wise direction, failed to mature, and now lie dead in us! Very many people are only partly alive. A large part, and, in some, the best part, is dead. The capacity they show is probably only a small share of a fine inheritance which, not knowing how to use, they allowed to die.

We have an instinctive liking for people who are strong and healthy. They appeal to us by their robustness and their confident display of energy. We do not now need the big muscles that were once necessary in wielding spear and battleax. We need, however, as much as the race ever needed, well-developed bodies and habits of health.

Exercise to be of much value must be *enjoyed*, so every person must select for his particular exercises those which he likes best and which are available. Exercise, in a word, should be largely a matter of play, but play of an organized, purposeful character. Once this conception of exercise is understood and put into effect as a habit of life, the individual greatly reinforces his possibilities for health, happiness, and life expectancy.

*Recreation* is always *play* in some form, and play continues to perform an important function in our lives from earliest childhood until old age. When we stop playing, we practically stop living. Play is our opportunity for self-expression, and only the sick or feeble-minded fail to exercise this instinct in one form or another. The better we play, the better we live.

Play is at first preparation for life, and later continues throughout normal life as a progressive preparation. "Play," says Professor Seashore, "fits for the larger life to the extent that the individual retains plasticity and interest in growth. So long as one is alive, there is ever something to learn. There are visions

to be seen, inspirations to be received, ideals to be set aglow, sympathies to be cultivated, emotions to be refined, dreams of achievement to be enjoyed, riddles of life to be solved by the proof of experience."

Without play little of this would be possible, for enjoyment would cease and the possibilities for adaptation to the more serious things of life would become quite difficult. Many people play without realizing it. Music, art, poetry, achievements of various kinds, anything which brings new impressions and associations, may serve as play. When we stop playing, we grow stale, and become *mentally fixed*. Serious achievement then becomes practically impossible. Play is a *social instinct*, and without it, common fellowship with others is lost. The most alert minds most enjoy and profit by play. The dull and feeble-minded play little or not at all.

The modern methods of education of children are based largely on the play instinct, and there is no reason why such natural methods should not be utilized throughout all education. As a matter of fact, those who succeed best in this world are those who discover a work which for them is largely play. Any activity which is constantly difficult and irksome is never rewarded with any great results. We succeed best in those things we like best, and which to us are in some degree forms of play.

The truly great lawyer, doctor, minister, musician, explorer, merchant, or investigator, all find play in their business or profession, whether they are conscious of it or not. The only reason why some people who are not well suited to their daily work succeed at all is that they discover some form of regular play or *avocation* outside of their daily occupation. This we usually call a "fad," but cultivation of fads, while valuable and desirable for most people, would be less necessary if work could be regarded as a stimulating form of play.

Through exercise and some forms of play many good habits may be formed; correct postures may be acquired; fairness in judgment of others, skill, exactness, courage, enthusiasm, grace, and a host of useful qualities, become an essential part of our characters. The one who has learned the simple principles of *health habits* is well prepared to play the game of life.

**Related Subjects.** The reader is referred in these volumes to the following articles:

|                           |                         |
|---------------------------|-------------------------|
| Athletics                 | Games and Plays         |
| Baby                      | Habit                   |
| Bacteria and Bacteriology | Heating and Ventilation |
| Baths and Bathing         | Hygiene                 |
| Board of Health           | Life Extension          |
| Breath and Breathing      | Mastication             |
| Diet                      | Mental Handicaps        |
| Digestion                 | Nutrition               |
| Disease                   | Physical Culture        |
| Education                 | Proteins                |
| Fatigue                   | Sleep                   |
| Food                      | Vitamins                |

**HEALTH-INSURANCE ACT.** See OLD-AGE PENSIONS.

**HEARING, PROCESS OF.** See EAR (How We Hear).

**HEARN, hurn,** LAFCADIO (1850-1904), a writer of exotic, richly colored essays, and a sympathetic interpreter of Japanese life and art. The career of Lafcadio Hearn holds absorbing interest for the reader who has been captivated by his delicately polished style and the charm and originality of his writings. He was the son of an Irish officer and a Greek woman, the two having met during the English occupation of the Ionian Islands. On one of these islands, Leucadia, the boy was born. He himself adopted the name Lafcadio, taking it from the name of the isle of his birth, which was pronounced *Lefcadia*. Though reared in the Roman Catholic faith, he turned against all religion because of an unhappy boyhood spent in the home of a puritanical Welsh grandaunt. A natural rebel, the boy had the misfortune to lose the sight of one eye in an accident, and this increased his unhappiness. His other eye was naturally weak, and the added strain to which it was subjected caused the eyeball to bulge until his appearance was a cause of discomfort to him for the rest of his life. In his later years, he was almost, if not entirely, blind.

At the age of nineteen, the youth was forced to earn his own living. Emigrating to America, he became a newspaper reporter. At first he lived wretchedly, but while working for the New Orleans *Times Democrat*, he created a sensation in journalistic circles by writing a particularly gruesome description of a half-burned corpse that had been found in a furnace. Though Hearn did not see the body himself, he described it with a vividness that has made his sketch a marked piece of reportorial writing to this day. His editor, recognizing his genius, sent him to the West Indies, and here, for two years, he served as a correspondent.

In 1891 Hearn journeyed to Japan. In his business and his personal relations, he was very erratic, and a projected commission as newspaper correspondent did not materialize. He, however, was so charmed by the life and people of Japan that he made that country his home, married a Japanese woman, adopted the Buddhist faith, and became professor of English literature at the Imperial University at Tokyo. His best work was done during this period of his life; as an interpreter of Japanese mysticism, culture, and philosophy, he has no equal. Hearn's extraordinary literary gifts, his peculiar temperament, and his bohemian views of life make his several biographies most interesting reading.

**His Writings.** Representative of his earlier works are *Chila*; *Two Years in the French West Indies*; and *Youma, the Story of a West Indian Slave*. His Japanese

stories and essays are published under numerous titles, including *Glimpses of Unfamiliar Japan*, *Reveries and Studies in New Japan*, *Gleanings in Buddha Fields*, *A Japanese Miscellany*, *Exotics and Retrospections*, and *Japan, an Attempt at Interpretation*.

**HEARNE, SAMUEL** (1745-1792), a Canadian explorer and trader, for many years an employee of the Hudson's Bay Company, whose advance from the shores of Hudson Bay into the great interior is generally credited to him. He was stationed at Fort Prince of Wales, at the mouth of the Churchill River. When, in 1769, the company decided to investigate stories told by Indian traders, it chose Hearne to lead an exploring party. His orders were to go as far as 70° north latitude, to smoke the calumet of peace with the Indians, to take astronomical observations, to reach this "river abounding with copper and animals of the fur kind," and, finally, to determine the existence or non-existence of the Northwest Passage. After two unsuccessful starts, Hearne reached the mouth of the Coppermine River in July, 1771, and by June, 1772, was again at Fort Prince of Wales. Considering the difficulties of the country through which the expedition passed, Hearne's achievement was notable, and it was important because it established friendly relations with the Indians from the shores of Hudson Bay to Lake Athabaska. G.H.L.

**HEARST, PHOEBE APPERSON** (1842-1919), an American woman of great wealth, who has contributed generously to many educational projects. She married Senator George Hearst, mining capitalist, in 1862, and has one son, William Randolph Hearst, newspaper publisher. At Lead, S. D., and Anaconda, Mont., near where the Hearst mines were located, she established kindergartens and built and maintained libraries. Her philanthropies include kindergarten classes, supported for several years in San Francisco, and a training class for kindergarten teachers and the National Cathedral (Episcopal) School, both in Washington, D. C.

Mrs. Hearst made possible a permanent plan for the development of the campus and buildings of the University of California. She sponsored an architectural competition (1898-1899), and gave the Hearst Memorial Mining Building, built in memory of her husband. For many years, Mrs. Hearst was a regent of the University of California. See CALIFORNIA (Education: University of California); HEARST, WILLIAM RANDOLPH.

**HEARST, WILLIAM RANDOLPH** (1863- ), an American newspaper-owner, editor, and politician, and one of the best-known publishers in the world. He is the only son of former United States Senator George Hearst of California, a "Forty-niner," as the gold-seekers of 1849 were called, and one of the "bonanza kings" of California. The son was educated

at Harvard University, where he became interested in college newspaper work; before his graduation, he was editor in chief of the *Harvard Lampoon*.

Given his choice of his father's many holdings, he chose a newspaper in San Francisco, which the family had acquired for political reasons. This paper, the *Examiner*, became a financial success after many thousands of dollars were spent; then Hearst's ambitions turned toward New York. He bought the morning *Journal*, and made that paper profitable in a short space of time. A year later he founded the *Evening Journal*, and renamed the morning paper the *American*. He later started the Chicago *American* (evening), the *Chicago Examiner* (morning), the latter now the *Herald and Examiner*, and within a few years acquired daily papers in Boston, Washington, Atlanta, Baltimore, Syracuse, Rochester, Albany, Pittsburgh, Detroit, Milwaukee, Seattle, Los Angeles, Oakland, and San Antonio. Besides these newspapers, he publishes several magazines, of which the most important are *Hearst's International-Cosmopolitan*, *Harper's Bazar*, *Motor*, *American Weekly*, and *Good Housekeeping*.

Hearst was elected to Congress for two terms (1903-1907) from New York City, was an unsuccessful candidate for the Democratic nomination for President of the United States in 1904, and in 1905 was defeated for the mayoralty of New York City on the municipal-ownership ticket. In 1906 he was defeated in his ambition to become governor of New York, after having been nominated by an independent party which he had organized. For several years he was also engaged in motion-picture production.

**HEART.** When the Psalmist sang, "I will praise thee with my whole heart," he meant by "heart" the seat of the conscious life. This symbolism is common in all languages, and it shows that the heart is considered the center of the emotional and spiritual nature.

As an organ, it has an important mechanical function. It is the muscular pump by which the blood is driven through all parts of the body. It is a tireless member, working day and night from before birth until the end of life, and stopping to rest only between its strokes, familiarly called "beats." The heart of the

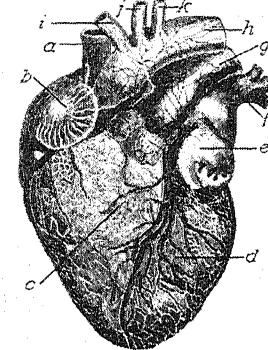
tiny baby beats 120 times a minute, that of a child of seven, ninety times, and that of an adult, between seventy and eighty times—seventy-two being the average.

It is interesting to estimate the amount of work done by this busy machine. At the rate of seventy strokes a minute, it beats nearly 37,000,000 times a year. About six ounces of blood are moved at each stroke, making a total of eighteen pounds a minute, twelve tons a day, and 4,380 tons a year. The work done each day by the heart corresponds to that performed by a man of average weight in running up a flight of forty steps forty times, or in climbing a mountain 2,500 feet high. The force expended by the heart in one hour would raise a man weighing 160 pounds seventy-two feet. A day's work of the heart is estimated to be equal to that of about seven and one-half horse power.

**Description.** The heart is a flattened, pear-shaped pouch about the size of a closed fist, averaging five and one-half inches from base to apex and three and one-half inches across its broad surface. In men its approximate weight is eleven ounces; in women, nine ounces. It lies obliquely within the chest, with its broader end, or base, in the direction of the right shoulder and its apex pointing downward, forward, and toward the left. As the lower part can be felt beating the more easily, for at each stroke the narrow end strikes against the wall of the chest, it is commonly believed that the heart is on the left side of the body. On the contrary, it lies very nearly in the middle line. The narrow end can be felt beating if the hand is placed between the cartilages of the fifth and sixth ribs to the left of the breastbone. The larger end extends along the right side of this bone upward to the third rib. The whole organ is enclosed in a bag of membrane called the *pericardium*, and is nourished by blood conveyed to it by the *coronary arteries*.

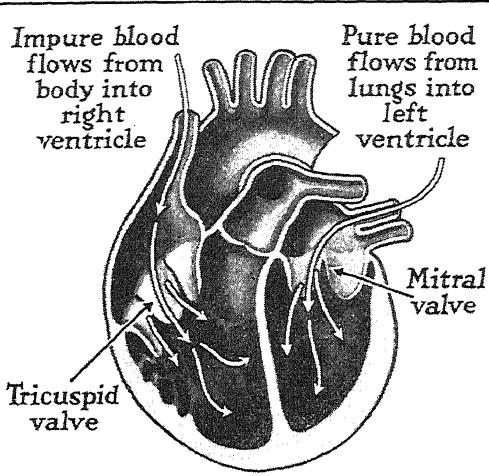


Photo: U & U  
WILLIAM RANDOLPH HEARST



EXTERIOR (FRONT) VIEW

- (a) Superior vena cava
- (b) Right auricle
- (c) Right ventricle
- (d) Left ventricle
- (e) Left auricle
- (f) Pulmonary vein
- (g) Pulmonary artery
- (h) Aorta
- (i) Right subclavian artery
- (j) Right carotid artery
- (k) Left carotid artery



1

The heart is ingeniously constructed to pump two different streams of blood at the same time, and is divided into right and left cavities, with no opening whatever in the muscular partition which runs down its center from top to bottom. Each of these cavities is in turn divided into an upper and a lower chamber, called, respectively, right and left auricles and right and left ventricles. All four chambers have elastic, muscular walls, but those of the ventricles are much the stronger and thicker, because the latter are the pumping chambers of the heart and do the harder work. Furthermore, as the left side pumps blood throughout the body, and the right side only through the lungs, the walls of the left ventricle are three times as thick as those of the right ventricle.

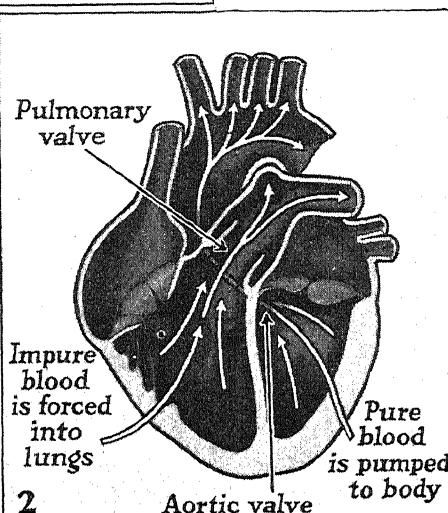
**Circulation in the Heart.** This section should be read with reference to the article BLOOD, where there is a color plate showing the circulation of blood through the body. The auricles are the receiving chambers of the heart, the ventricles the delivery rooms. The blood which is to circulate through the lungs enters the right auricle through two large veins, the *venae cavae*. From the right auricle it is forced by the contraction of the walls of that chamber into the right ventricle, passing through an opening guarded by a valve consisting of three little triangular flaps of membrane (*tricuspid*

*valve*). This valve is so constructed as to permit the blood to flow into the ventricle, but prevents its flowing backward, acting something like double swinging doors which open in but one direction. Between the left auricle and left ventricle is a similar valve having two flaps, and called, because of its resemblance to a bishop's miter, the *mitral valve*.

When the right ventricle is filled, its muscles contract and squeeze the blood into the *pulmonary artery*, which leads to the lungs. The walls of the auricle, at the same time, are relaxing and receiving another supply of blood. The pressure exerted by these movements closes the tricuspid valve and opens three valves between the ventricle and the pulmonary artery. These are called *semilunar valves*, because they are shaped like half-moons, and they are also so constructed as to prevent the blood from flowing backward. When all

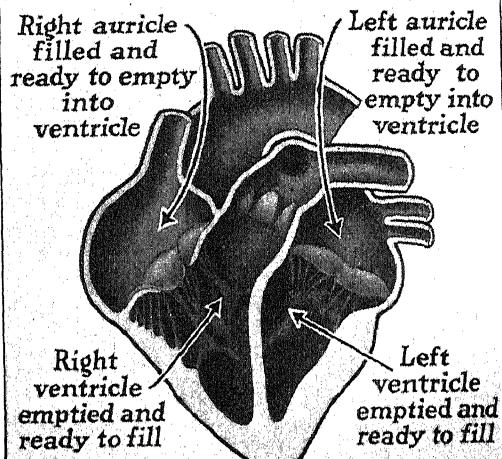
of that fluid is expelled from the ventricle, its walls relax and the semilunar valves close. The blood then flows into the lungs, where it goes through a purifying process, returning to the left auricle through the *pulmonary veins*.

Now begins the circulation of the purified blood through the left side of the heart. From the left auricle the blood passes into the left ventricle through the *mitral valve*, and out of the left ventricle through another set of semilunar valves into the largest artery in



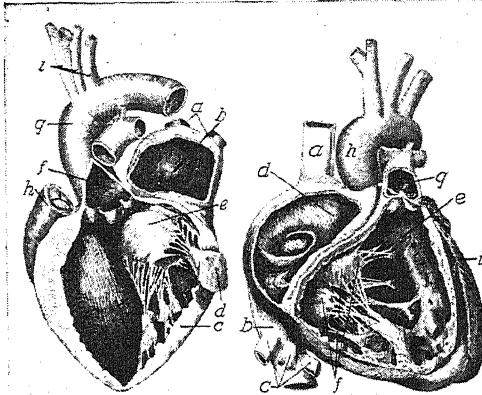
COURSE OF THE BLOOD THROUGH THE HEART

2



3

the body, the *aorta*. This artery, by means of its numerous branches, sends the blood to all parts of the body; when the circulation is completed, it is returned to the right auricle to start again on its journey through the lungs. It requires only about half a minute



NAMES OF THE PARTS OF THE HEART

At left—The left auricle and ventricle opened. A part of the left and anterior walls has been removed. (a) The two right pulmonary veins cut short; their openings are seen within the auricle. (b) The cavity of the left auricle. The larger cavity, below and to the left, is the ventricle. (c) The cut surface of the walls of the ventricle seem to become very much thinner toward the apex. (d) A small part of the anterior wall of the left ventricle which has been preserved. (e) The mitral valve, which prevents the return of the blood from the ventricle to the auricle. (f) Showing the interior of the aorta, near its commencement and above the three segments of its semilunar valve, which are hanging loosely together. (g) The exterior of the great artery or aorta. (h) The root of the pulmonary artery and its semilunar valves. (i) The arteries rising from the summit of the aortic arch.

At right—The right auricle and ventricle opened. A part of their right and anterior walls has been removed. (a) Superior vena cava. (b) Inferior vena cava. (c) Hepatic veins cut short. (d) Right auricle. (e) Cavity of the right ventricle. (f) Tricuspid valve. (g) Showing the interior of the pulmonary artery, a part of the anterior wall of that vessel having been removed, and a narrow portion of it preserved at its commencement, where the semilunar valves are attached. (h) The ascending part or sinus of the arch of the aorta. (i) The outside of the left ventricle.

for a drop of blood to make the entire round of the circulation. An interesting feature of this process is the fact that the two sides of the heart, though doing different work, contract and empty themselves and relax and fill at the same time. Therefore only one beat can be felt. With each stroke there is a wave of swelling in the walls of the arteries throughout the body, which can be felt as a distinct beat or throbbing in places where the artery lies near the surface. See PULSE.

**Sounds of the Heart.** Two different sounds are made by the heart as it carries on its labors. The first, supposed to be caused by the vibration of the contracting muscles, is a

dull, muffled sound which can be imitated by pronouncing the syllable *lub*; this is followed by a shorter and sharper sound—*dup*—which is due to the sudden closing of the semilunar valves. The first sound continues during three-tenths of the beat, and is followed by a pause lasting one-tenth; two-tenths are next taken up with the second sound, and then there is a pause lasting four-tenths of the beat. If you place your ear against the chest of a person, over the region of the heart, you can hear these sounds distinctly. When the valves are diseased and do not work properly, the condition is indicated by a sort of blowing sound. That is why the physician listens to the sounds of the heart when he suspects that these valves are out of order, or wishes to ascertain whether they are working normally.

**Care of the Heart.** If this active pumping organ did not possess strong powers of endurance, it could never endure the strain to which it is constantly subjected. The heart works for all the other parts of the body; the stomach calls for a larger supply of blood to help it in digesting the food; the brain cells need more blood when we are studying or thinking hard; when we engage in active forms of work or exercise, the heart must beat faster to provide us with the necessary energy. Furthermore, its nerve cells are very sensitive and respond quickly to outside influences. A sudden, unexpected outcry, for instance, makes it beat faster; its action is hastened by anger, joy, excitement, etc. Thus it is seen that there are numerous demands made upon the heart every day; for this reason we should not overdo in our work or in our play. Outdoor exercise, if it is kept within the proper limits, is excellent for building up the physical organism and for strengthening the heart, but overindulgence in athletic sports may bring on permanent weakness of that life-sustaining organ. It is a good rule to stop active exercise when you begin to feel tired, or when the heart begins to beat too violently.

All kinds of alcoholic liquors have a harmful effect on the heart. Long-continued use of these beverages may cause a deposit of fatty tissue in place of muscular fibers, a condition known as "fatty degeneration." This interferes with the work of the ventricles and valves and may cause death by heart failure. Alcohol is a direct poison to the cells of the heart; it overstimulates that organ and causes it to beat with needless vigor, and it weakens it by impairing the nutritive qualities of the blood which nourishes it. In many states and provinces, the laws require that pupils in their physiology classes be taught the harmful effects of strong drink.

The excessive use of tobacco is also to be condemned. A surgeon general of the United States army has reported that candidates for

West Point who are annually rejected because of irregularities of the heart's action are nearly all users of tobacco. In fact, all stimulants, including coffee and tea, should be used with discretion.

**Disease of the Heart.** Heart disease reduces the life expectancy of its victims by about one-half. Carefully compiled statistics show that heart disease is the greatest single cause of death in the United States, and that over 200,000 persons succumb to it annually throughout the country. It is estimated that from 2,000,000 to 2,500,000 persons living in America are suffering from some form of heart disease, and that about fifteen out of every thousand school children are affected. There is another side to the story, however. The investigators have found that the heaviest increase in cases of fatal heart disease is among persons over eighty, that the proportion of cases steadily grows less with lower-age groups, and that heart disease is decreasing among children and young people less than twenty.

The reasons for these statements are not hard to find. Increase in population gives us an increasing number of persons who live to reach the age of sixty and above. There are more old people to die of heart disease than there used to be, and they swell the total of fatal cases. Furthermore, heart disease is chiefly caused by infectious diseases of the body; rheumatism and syphilis are the principal offenders, but diphtheria, typhoid fever, scarlet fever, and some others have their share of the blame. These diseases weaken and damage the heart by the toxins they produce, and it is tremendously important, from the standpoint of the welfare of the heart, that persons suffering from such diseases be under the care of a physician from the onset of the disease until long after all the symptoms disappear. The encouraging factor is the increasing control over bacterial diseases that is being achieved by the medical profession. Vaccination, serum therapy, quarantine, and better hygiene and sanitation are all reducing the menace of germ diseases. It follows, then, that in another generation there will be far fewer persons to succumb to heart failure arising from infectious diseases, and the statistics will then tell another story.

Some of the special forms of heart disease are the following:

*Myocarditis*, inflammation of the muscular layer of the heart walls.

*Endocarditis*, inflammation of the lining membrane.

*Pericarditis*, inflammation of the bag enclosing the heart, causing the membrane to become thickened and roughened.

*Hypertrophy*, enlargement of the walls of the heart, sometimes accompanied by fatty degeneration. K.A.E.

**Related Subjects.** For supplementary information concerning the heart and its activities the reader is referred to the following articles:

Angina Pectoris  
Aorta  
Arteries  
Blood  
Blood Pressure

Capillaries  
Membranes  
Pericardium  
Pulse  
Veins

**HEART RIVER.** See NORTH DAKOTA  
(Rivers and Lakes).

**HEARTSEASE**, a flower. See WALLFLOWER.

**HEART SPASM.** See ANGINA PECTORIS.

**HEARTWOOD.** See ALBURNUM; SAP  
(Movement).

**HEAT.** Everyone is familiar with the sensations produced by what are termed *heat* and *cold*. The study of these so-called "heat-effects" and of the laws according to which they are produced forms what is known in physics as *heat*, or *thermodynamics*.

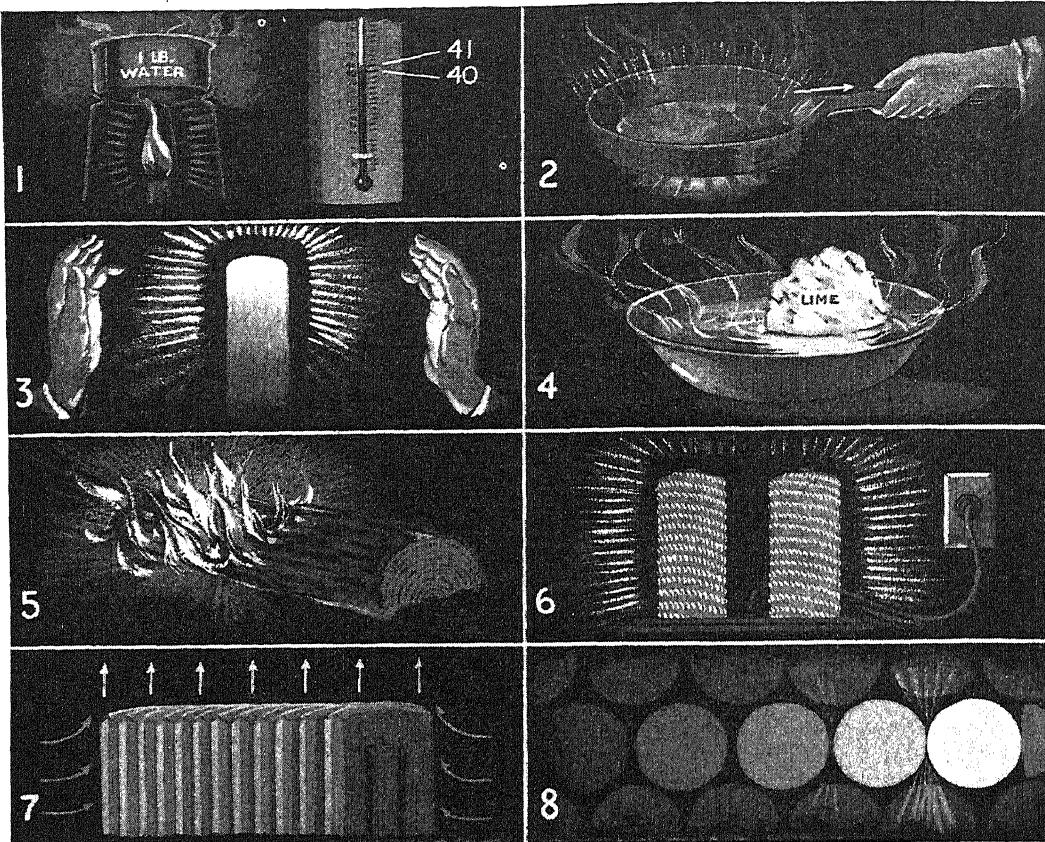
**What Heat Is.** Every substance, whether solid, liquid, or in the form of gas, consists of a great number of small particles called *molecules*. These molecules are constantly in motion, and *heat* is the energy of the agitation of these molecules. When their motion is very rapid, a substance is said to be *hot*; when it is less rapid, the substance is said to be *cool* or *cold*. The point at which all molecular motion would cease is called *absolute zero*, but this is purely theoretical—it is a degree of coldness that has never been reached. Heat is not the result, nor is it the cause, of molecular motion. Heat is the kinetic energy of the molecules.

**Where Heat Comes From.** (1) Most of the energy or heat that is available for use comes either directly or indirectly from the sun. All plant life and all animal life depend for their existence on this great hot ball around which our world revolves. If the sun, which is estimated to have a temperature of about 10,000° F., should cool, all life would be extinguished and the earth would become a cold, dead mass like the moon.

(2) Hot springs and volcanoes supply heat, and are proofs of the belief that the interior of the earth has a very high temperature.

(3) Electric currents are another source of heat. Whenever an electric current passes through a substance, its temperature is raised. The hottest furnaces in the world are the electrical furnaces at Niagara Falls; these have a temperature of about 7,000° F., or more than twice the heat of boiling steel. Flames as hot as these cannot be produced in a blast furnace because they consume iron containers and tools as though they were paper, and reduce fire brick to the consistency of putty.

(4) Such mechanical actions as *friction* and *compression* produce heat. Water can be heated by friction until it boils. A piece of wood may be set on fire by friction. Many a hunter or trapper has resorted to the device savages employ, of obtaining a flame by twirling a pointed stick in the hollow of a piece of dry wood. A piece of metal may be heated by



## HOW HEAT IS PRODUCED AND MEASURED

(1) British thermal unit: the amount of heat required to raise the temperature of one pound of water one degree.  
 (2) Heat passes through the skillet handle by conduction. (3) By radiation, heat flows in all directions. (4) It is chemically produced through the reaction of lime and water. (5) The flame (rapid combustion) is the best-known source of heat. (6) It is electrically produced through the resistance a wire offers to the electric current. (7) By convection, hot air rises, and cold air rushes in, thus distributing heat. (8) It is produced by impact: pounding a solid object causes molecules to become heated. In the illustration the molecules are immeasurably enlarged, to give emphasis.

striking it or by rubbing it against another surface. Every child has probably heated a penny by rubbing it on a carpet, or has burned his skin sliding down a rope.

The other mechanical means of producing heat is by *compression*, and this is a well-known heat effect. If a gas is compressed, its temperature is raised. But here, just as in the heat effects produced by friction, *work* is required to produce heat, and in each case the amount of heat produced depends on the amount of work done. Scientists have estimated the amount of mechanical energy that will produce a definite amount of heat, and have termed the numerical relation between work and heat the *mechanical equivalent of heat*.

By careful experiments it has been found that the work done in raising a mass of 778 pounds to a height of one foot will, if converted into heat, raise the temperature of a pound of water  $1^{\circ}$  F., and that done in raising 427.5

kilograms one meter will raise the temperature of a kilogram of water  $1^{\circ}$  C. Then 778 foot-pounds or 427.5 kilogram-meters of work are equivalent to this amount of heat. Quantity of heat is measured by British Thermal Units (B.T.U.) in the English system, and by kilogram-calories in the metric. One B.T.U.= 778 foot-pounds of work; 1 kilogram-calorie= 427.5 kilogram-meters of work.

(5) Many chemical actions, such as the combustion (burning) of substances like carbon and oxygen, produce heat. An ordinary flame is the result of the combustion of these two elements. It is the combustion of carbon and oxygen that produces the heat of our bodies. Carbon is one of the waste products of the body, the result of the breaking-down of cells which occurs with every movement. When this carbon comes in contact with the oxygen supplied by the lungs, heat is produced. This is one of the reasons why,

if you work very hard and fast, or run rapidly, you get warm.

(6) Changes in the state (solid, liquid, gaseous) of a substance, or in the arrangement of the molecules of which matter is composed, will liberate or absorb heat, depending on the direction of the change. When water freezes, heat is given off. A tub of water is sometimes placed in a conservatory on a night when frost is expected, because, as the water freezes, it gives up heat energy to the surrounding room, or "takes the frost out of the air," as the household doubtless expresses it.

**How Heat Travels.** Energy or heat is transferred from the molecules of one body to those of another in three ways: by *convection*, by *conduction*, and by *radiation*.

**Convection.** In this process of heat transference, the molecules of the body whose temperature is raised move away to other places in the body, and thus tend to raise the temperature of the entire body. The molecules of solids cannot move about from place to place, so convection is limited to fluids. If a vessel of water, or any other liquid, is placed over a fire, the portions of the liquid near the bottom become hot and so expand and become lighter, or less *dense*, than the rest of the liquid. This causes them to move upward toward the top of the liquid, and thus the heat is transferred. The process of convection is of great importance in heating houses, ventilation, in all the water in it becomes heated. This is an example of convection.

plants, and in the great phenomena of nature, such as winds and ocean currents. When a fire is started in a fireplace, the air in the chimney becomes heated and begins to rise, and the cold air pushes in from below, forming the so-called *draft* along the floor and up the chimney. You can see why the draft is not very great when the fire is being started, and why it increases in strength as the fire gets hotter.

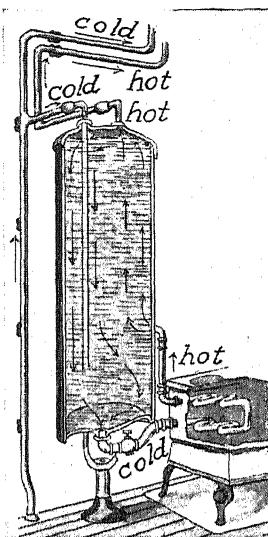
**Conduction.** In conduction, the separate portions of matter do not move away bodily, but the vibrating molecules hitting against each

other pass the energy from one portion to another. If a poker has one end in the fire, that end becomes hot; that is, the molecules begin to move rapidly. In moving rapidly they hit against the molecules next to them, and this raises the temperature of the next part, and so on down the entire length of the poker. One of the most interesting examples of the power of metals to conduct heat is the safety lamp which miners use (see **SAFETY LAMP**).

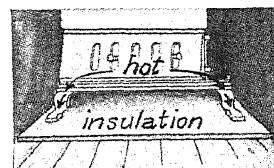
It has been found by experiment that all solids that can conduct electricity are good heat-conductors (see **ELECTRICITY**). Silver and gold, copper and iron, steel and aluminum, are in this class. Stone, glass, and paper are poor conductors. Mercury is the only good conductor among the liquids. Water is poor, and so are all gases, including air. The asbestos coverings on locomotive boilers and steam pipes are poor conductors of heat, and are put on to prevent its escape. Wool is a poor conductor, whether in its natural state on a sheep's back or made into garments. That is why woolen clothing is warm; in other words, the air in the meshes keeps the warmth of the body from escaping. Air is so poor a conductor that air spaces are left between the walls of refrigerators to dispute the passage of heat. The

reason that down comforters are warm is that the air entangled with the down keeps the body heat from escaping. Wood is a poor conductor, and that is why it is used for handles on pots and pans.

**Radiation.** In both of the processes of heat transference that have been described, the substance heated is in contact with the body that heats it. But there must be some other process of transference, for we all know that a hot stove will heat any object that is near it. We know that cloth can be scorched or burned without touching the stove. We know that the heat from the sun somehow succeeds in



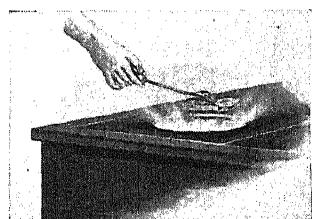
PRINCIPLE OF THE HOT-WATER HEATER



ANOTHER EXAMPLE OF CONDUCTION

The feet of a stove may serve as an example of heating by conduction. The under-

side of a stove and the feet become very hot, because iron is a good conductor of heat. The stove must be set on a platform made of some substance through which heat passes less readily, to prevent scorching the floor.



BY RADIATION

Another illustration of heat traveling by radiation is shown in the preparation of toast. Heat is carried from the fire by the ether waves.

reaching the earth. This process is known as *radiation*. Through radiation, heat is transferred from one point to another by means of waves. These waves can transfer heat across a vacuum or from the sun and stars to the earth. Scientists have therefore conjectured that there must be some medium which fills all the spaces, large and small, in the universe. This supposed medium is called *ether* (see *ETHER*).

Just as water waves spread out in rings from the spot where a stone falls into a pool, so heat waves spread in all directions from the vibrating molecules of hot bodies; and just as water waves break and give up their energy to pebbles on the shore of the pond, so the heat waves strike and give up their energy to particles of matter in their vicinity. Suppose the fire in the stove is reduced so that the temperature of the stove falls as low as that of your body. The stove does not cease to send out heat waves, for if we put a piece of ice near the stove, it will melt. As a matter of fact, the stove will continue to send out heat waves as long as its molecules continue to vibrate. It radiates heat at all temperatures above absolute zero, where all molecular motion ceases, and it radiates at a rate that is independent of the temperature of surrounding objects. We must remember, however, that the stove is absorbing heat, too, as the radiations from other bodies are falling upon it. If the other bodies are hotter than the stove, they are radiating faster than the stove, and the stove is therefore receiving more than it is giving out. When the stove is the hotter, it is radiating more than it is absorbing, and its temperature is falling, unless a fire supplies heat as fast as the stove parts with it. This principle is known as *Prevost's Theory of Exchanges*.

Heat waves are of the same nature as light waves. Both are electromagnetic radiations that differ only in wave-length, heat waves being longer than light waves (see *LIGHT*, for a more detailed explanation).

**What Heat Does.** Among the most familiar heat effects are change in volume, change in state, and change in molecular arrangement, such as melting or boiling.

(1) *Expansion.* Most solids and liquids, and all gases, expand when heated. Gases expand most, liquids much less, and solids least, with a given rise in temperature. This is the principle underlying the action of an ordinary thermometer. The glass bulb and stem of the thermometer expand, but the mercury which fills the bulb and a portion of the stem expands much faster than the glass; consequently, the mercury rises in the stem as the temperature goes higher. If the steel rails of a railway track are laid during cold weather, a space must be left between their ends, so that, in summer, when they are heated, there will be

room for them to expand. Expansion joints should always be left in brick and concrete roadways. Such joints are frequently filled with tar, which is squeezed out when expansion occurs. Since aluminum expands much faster than cast iron, aluminum automobile pistons must be loosely fitted when the engine is cold, or they will get so tight they cannot move soon after the engine starts, and they will get hot.

*Coefficients of Expansion.* The increase in length of a unit length of a substance when heated one degree is the coefficient of linear expansion of that substance. The increase in volume of a unit volume of a substance when heated one degree is the coefficient of volume expansion of that substance. Since volume is measured by length, breadth, and thickness, the coefficient of volume expansion is practically three times the linear coefficient. The expansion coefficient of all gases is the same; namely, for each degree Centigrade the temperature rises, the gas increases its volume  $\frac{1}{273}$  of its volume at the temperature zero Centigrade. The coefficient remains constant for all temperature ranges; consequently, gas (usually air) thermometers are frequently used where very accurate temperature measurements are necessary.

(2) *Heat Changes Solids to Liquids.* If ice is brought near a flame, instead of getting hotter it melts, or changes to water. This process requires a greater amount of heat in some cases than it does in others. Ice is only thirty-two degrees "cold," and immediately begins to melt if surrounded by warmth. Metals also become liquid if they are heated to a sufficient temperature. Lead does not have a very high melting temperature, and can be changed to a liquid over a hot gas flame. The melting, or fusing, point of lead is only 585 degrees, but that of most metals is very high. Platinum has such a high fusing point that it can only be melted in an electric furnace.

(3) *Heat Changes Liquids and Solids to Vapor.* When liquids are heated to the boiling point, they pass into a gaseous condition. There are some substances which, when they are heated, will pass directly from a solid to a gaseous state; camphor, zinc, and snow are among them. But while melting cannot begin until the temperature of the solid is raised to a definite degree, the process of *evaporation* is going on all the time from the surface of a liquid, no matter what its temperature. Clothes hung out to dry on a cold day will "freeze" dry. A vessel of water in the open air will be emptied by evaporation without ever reaching the boiling point.

(4) *Heat Produces Light.* When certain substances are raised to a very high temperature, they give off light as well as heat. The example with which most people are familiar

is that of some iron object which becomes *red-hot*, or even *white-hot*, such as a glowing coal or a flame. This property of matter has been utilized in the Welsbach gas burner, where, instead of getting light from the gas flame, the light comes from a cone of metal which is heated white-hot by the flame.

A.L.F.

**Related Subjects.** The following articles in these volumes bear more or less closely on the general subject of heat.

|                  |                         |
|------------------|-------------------------|
| Boiling Point    | Flame                   |
| Combustion       | Freezing                |
| Electric Heating | Heating and Ventilation |
| Electricity      | Molecule                |
| Energy           | Steam                   |
| Evaporation      | Sun                     |
| Expansion        | Temperature             |
| Fire             | Thermometer             |

**HEAT AS AN ANTISEPTIC.** See FIRST AID TO THE INJURED; ANTISEPTIC.

**HEAT EQUATOR.** See ISOTHERMAL LINES.

**HEAT EXHAUSTION**, a mild form of sunstroke (which see).

**HEAT FEVER.** See SUNSTROKE.

**HEATH, OR HEATHER**, *heth' ur*, the name of various modest evergreen shrubs common in Europe and Africa. The term *heath* also applies to large waste places on which such shrubs grow. In this latter connection, the term is seldom used in America, where shrubs of heather are rare. In recent years, however, the hardy Scotch heather has become a popular plant and cut flower in American flower shops, having been introduced in a few places in the Eastern United States. It has low, grayish, hairy stalks, broomlike branches, needlelike leaves, and spikes of tiny, purple-rose, bell-shaped blossoms. This species is common on moors and other large tracts in Great Britain and continental Europe, and is called *ling*. Heather flowers are rich in honey, and Mary Howitt, in *Autumn*, says:

Oh! beautiful those wastes of heath  
Stretching for miles to lure the bee.

The flowers of either the *cross-leaved* or the *fine-leaved heath* of the British Isles are the heather-bells of Scotch songs and stories, and they inspired Scott to write in the *Lady of the Lake*:

For heath-bell, with her purple bloom,  
Supplied the bonnet and the plume.

**Practical Uses.** Most of nearly 400 known species of heather are native to Africa, where many are remarkable for the size and beauty of their blossoms. In European countries the heather is used in making brooms and brushes, and trailing shoots are woven into baskets. The underground rootstocks of a species common in France yield the briarwood used for pipes. Heather seeds are eaten by many birds. Poor people in Scotland use heather for thatching

their houses. In some places, a liquid made from heather is used in tanning leather. Young heather shoots are used for forage, and no sweeter, softer outdoor bed could be desired by the shepherd than one of heather branches. Heather contributes greatly to the formation of peat bogs, and in that way it is of economic value, as well as a thing of beauty in those desolate places. See PEAT.

Although true heaths are not common in America, many familiar plants represent the heath family in that country; among these are the cranberry, huckleberry, rhododendron, azalea, and trailing arbutus. All are described elsewhere in these volumes. For illustration of the members of this family, see the article BOTANY, page 883.

B.M.D.

**Scientific Names.** The botanical name of the heath family is *Ericaceae*. The cross-leaved and fine-leaved heaths are, respectively, *Erica tetralix* and *E. cinerea*. Ling belongs to the genus *Calluna*, and is classed as *C. vulgaris*.

**HEATHCOAT, JOHN**, an inventor of a lace-making machine. See ENGLAND (The Cities: Nottingham).

**HEATH HEN.** See GROUSE.

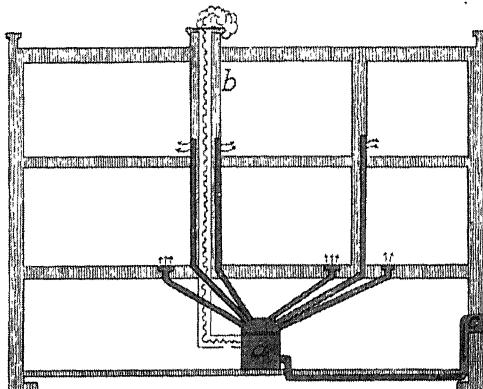
**HEATING AND VENTILATION.** Heating is the process of keeping living rooms at such a temperature that they may shelter human beings in comfort. Ventilation is the means by which the same space is supplied with fresh air in such measure and by such means as shall be conducive to continued health. To state it somewhat more pointedly, the object of heating is not only to make a building or a room warm, but to make it healthful; while the object of ventilation is to keep it healthful. The principles upon which these arts depend are so mutually involved that they are considered as one sanitary and engineering problem, and will be so considered in this article.

#### The Heating Problem

The human body needs to be kept at a temperature of 98.2° F. in order to sustain life processes; it loses heat in a cooler medium, the same as any other kind of matter. Food in proper chemical proportions creates heat, and clothing helps the body to retain it; a person can therefore live in comfort in temperatures considerably below body heat. In Northern Europe, people are accustomed to a temperature a little below 60°, while in the United States and Canada, about 68° to 75° is usually demanded. The thermometer marks 56° as "temperate," and doubtless those people who accustom themselves to such a temperature are more robust than others who insist upon warmer air in their rooms; when the thermometer is kept above 78° (summer heat), a condition of ill health is likely to result, except in cases of old age or invalidism.

The tendency of masses of air at different degrees of heat and cold is to equalize their temperature. Consequently, the air in a room artificially heated tends to lose heat until it reaches the temperature of the outside air, unless additional warmth is continually supplied. The rapidity with which the heated air escapes is also an important factor in maintaining the temperature. If it escapes freely, the temperature of the room is lowered more quickly than if it escapes slowly. Heat is lost through windows; three-fourths of what is lost in that way could be saved by double windows. A fire creates air currents, and much heat is lost by such means before it can affect the temperature; some escapes through cracks around doors and windows, and more by proper ventilation. It is the problem of the householder to provide sufficient heat to offset these losses and maintain an even, healthful temperature; when one has done so, he has practically mastered the science of heating.

The temperature of a room is raised in either of two ways. One method, known as *direct radiation*, is the heating of air already in the room by means of stoves and fireplaces, or by radiators connected with pipes which conduct hot water or steam produced in boilers.



HEATING BY FURNACE

(a) Furnace, with pipes running to all rooms of the building. (b) Chimney. (c) Cold-air entrance to furnace from outside. The arrangement of pipes in a system employing steam or hot water is substantially the same, each pipe running to a coil of pipes in a room, such coil being known as a radiator.

The other, *indirect radiation*, consists in bringing into the room air which has been warmed by being passed over a central heated surface, such as a coil of steam or hot-water pipes.

**Warm-Air Heating.** Commonly used warm-air furnaces provide warmth by means of indirect radiation, for the air is first heated by circulating between the inner part of the furnace, where the fire burns, and the outer casing, and is then conveyed through large

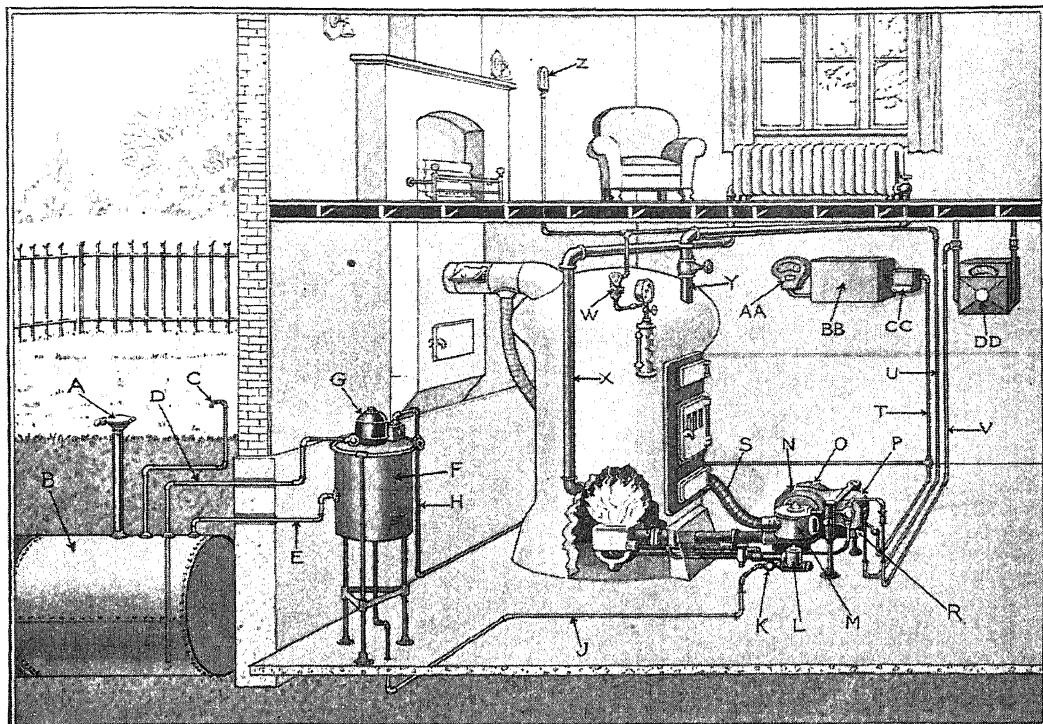
pipes or flues to the various rooms, which are provided with metal-covered openings, called registers. Warm-air furnaces provide heat and considerable ventilation, for a supply of fresh air from out-of-doors is being continually brought to the furnace through a duct which connects with the outer casing. The indirect method of heating is the more sanitary of the two systems; direct radiation may warm air which is already foul, and thus prove a source of danger to health.

The drying tendency of any heating appliance should always be considered. The air in a room cannot be healthful unless it contains a certain proportion of moisture, and in homes where direct-radiation systems of heating are used, it is advisable to place a pan of water on a radiator in each room. The air is thus supplied with moisture by means of evaporation. There are on the market patent devices which accomplish this end. When the indirect-radiation system is employed, the furnaces are equipped with evaporating pans, which should be kept full of water.

**Hot-Water and Steam Heating.** In modern buildings where the newest type of heating by fuel-oil burners has not been installed, steam and hot-water heating plants have largely superseded warm-air furnaces. Though more expensive to install, each of these systems can be operated with more economy of fuel than the old type of furnace. They give better satisfaction, for they provide heat more uniformly; they are also cleaner, and the central heating body is unaffected by the direction or violence of the wind. The latter is probably the most serious limitation of the hot-air furnace.

The essential parts of the hot-water and steam plants are a hot-water heater or steam boiler, a furnace, a system of pipes, and radiators. In the one case, water is circulated through the pipes when it has reached a temperature of  $140^{\circ}$  F.; steam is circulated under pressure at a temperature of  $212^{\circ}$  F. In the water system, heat is obtained as soon as the water is warmed, while with the steam system no heat is available until the water in the boiler has developed sufficient steam pressure to circulate through the pipes. Hot-water heat, however, is not so quickly shut off as steam heat. The water system has the advantage of operating noiselessly; steam, when first turned on, usually makes itself heard. In point of cost, a steam plant is less expensive to install than the hot-water, but is more expensive to operate.

**Oil Heating.** Oil burners are now widely used, both for business houses and residences. The principle involved is the conversion of fluid oil to a gas that will burn properly when mixed with air. The great advantage of this type of heating is the fact that, regardless of



INSTALLATION OF OIL HEATING SYSTEM

(A) Where oil is received, to be stored in tank (B). (C) Air vent. (D) Oil pipe to pump. (E) Overflow pipe. (F) Oil pump. (G) Motor for pump. (H) Electric circuit to pump. (J) Oil feed pipe to float chamber. (K) Oil valve. (L) Oil feed assembly (float chamber). (M) Mixing chamber for air and gases. (N) Blower housing. (O) Blower motor. (P) Regulator, or control motor. (R) Electrical connection box. (S) Flue gas conduit. (T) Service wire to burner. (U) Thermostat wire to burner. (V) Gas pilot connection. (W) Master control. (X) Return pipe to boiler. (Y) Steam pipe to radiator. (Z) Thermostat. (AA) Public-service electric meter. (BB) Public-service gas meter. (CC) Switch box. (DD) Public-service gas meter.

the weather, the house is always kept within a degree or two of the desired temperature by means of an automatic-control device, called a thermostat. As soon as any variation in the temperature is registered, the thermostat, which is set for the exact degree of heat desired, immediately makes an electric contact that starts up or closes down the oil burner in the basement. An oil burner may be installed in either a hot-air, steam, or hot-water plant, and the success depends largely upon the efficiency and condition of the heating plant.

**Heating the Home by Electricity.** An electrically-heated home, without chimney or coal bin, has been for some time a reality. The general principle embodies a device similar to that of a thermos bottle. In substance, heat is stored in a great thermos bottle, or container, well insulated, and is at the command of the home owner when needed.

The method consists of heating larger thermal storage tanks of water, using electric current for the purpose only at night, when it can be obtained at the lowest cost; the heat

stored is released within the home as required. The same plan, either in conjunction with the home-heating system, or independently, can be used to supply the domestic hot-water needs. The new system can be installed as a hot-air, hot-water, vapor, or double-pipe system. The charging or storage of heat is substantially the same in all cases, the only difference being in the manner of discharging the heat.

Heat by electricity is not the product of combustion, and does not consume oxygen. The amount of oxygen in the air, ordinarily used to a great extent by coal, oil, gas, or wood fires, is therefore left intact, and the products of combustion, such as smoke, gases, soot, and ashes, do not exist. Thus, electricity is an ideal heating agency.

Instead of transporting household fuel, in many instances thousands of miles, heat or power is generated at the power station and conveyed to customers in the same way electric current is conveyed for lighting homes, heating ranges, cooling refrigerators, and operating other electric appliances.



Photo: General Electric Co.

THE OLD-STYLE COAL-BURNING, HOT-AIR FURNACE

To the home owner, the safety factor is perhaps the most important. As there is no combustion in the house, there is, consequently, no danger from fire. The system is noiseless, and all energy purchased is delivered into the house as heat. It is simply the release of stored heat, controlled by a thermostat. From the housewife's viewpoint, it reduces to a minimum the cleaning of drapes and the need of redecorating, for the customary ashes, smoke, and soot are entirely eliminated. In addition, there is also the absence of obnoxious and dangerous gases and odors, which often come from other methods of heating, and which cause bodily ills.

**Heating by Gas.** Gas may be burned in fireplaces, stoves, or furnaces, but in most localities it costs approximately 50 per cent more than coal. Gas heaters, which may be attached to the ordinary lighting jet, and gas fireplaces are often found in homes where coal is regularly burned, and they are very much appreciated when a sudden change of weather brings discomfort, especially during the season when the furnace is not in use. The great objection to gas as a fuel in open heaters is that it consumes too much of the oxygen of the air. Gas furnaces, however, have proved successful and convenient in localities where natural gas is available.

### The Ventilating Problem

The ventilating problem is a twofold one, involving the expulsion of impure air as well as the admittance of fresh air. Air becomes foul in a room containing human beings, because microbes are exhaled in coughing, sneezing, and speaking, and dust is disseminated from soiled clothes. Much of the foul air is caused by overheating, it should be known. Unless there is a constant circulation of air in a room, such a room speedily becomes an unwholesome place in which to stay. It has been estimated that the supply of fresh air for each person in an ordinary living room should be not less than 1,800 cubic feet per hour. In a room fifteen feet long, twelve feet wide, and ten feet high, there are exactly 1,800 cubic feet of space. If there are six persons in that room, the air becomes foul unless it is changed six times an hour, or every ten minutes. *Cold* air is not necessarily *fresh* air.

It is not enough, in providing for the ventilation of a room, to open the window from the bottom. Fresh air cannot enter unless the warm, impure air is allowed to escape; this may be provided for by lowering the sash from the top. Proper ventilation of the sleeping room is of highest importance. Even in the coldest weather, all of the bedroom windows

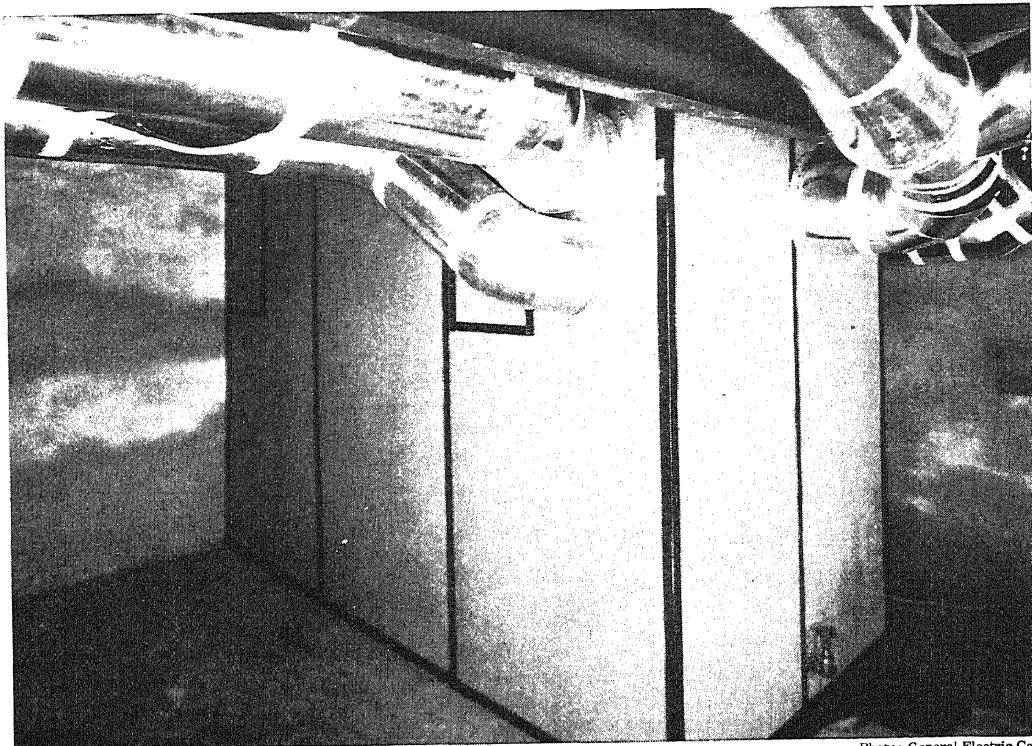


Photo: General Electric Co.

## SUCCEEDED BY THE NEW ELECTRICAL HEATING.

should be raised from the bottom and lowered from the top. Screens may be used if the wind happens to be too strong, and extra bed-clothing if the weather is unusually severe. Sleeping in a properly ventilated room is an excellent way to resist colds, and it makes for health, optimism and vitality.

It is obvious that in theaters, churches, and other places of assemblage, where large numbers of people congregate, the allowance of fresh air per person should be greater than in an ordinary living room. The following table, prepared by Dr. John S. Billings, an authority on heating and ventilation, shows what may be considered the ideal allowance for various buildings:

|  | CUBIC FEET OF<br>AIR PER HOUR |
|--|-------------------------------|
| Hospitals.....                               | 3,600 per bed                 |
| Legislative assembly halls.....              | 3,600 per seat                |
| Barracks, bedrooms, and work-shops.....      | 3,000 per person              |
| Schools and churches.....                    | 2,400 per person              |
| Theaters and ordinary halls of audience..... | 2,000 per seat                |
| Office rooms.....                            | 1,800 per person              |

The ventilation of the ordinary dwelling house is usually provided for by the natural interchange of air through doors and windows, and in some cases by a system of flues in con-

nexion with the heating plant. For supplying large buildings with fresh air, it is now customary to install some mechanical system of ventilation. The system most generally adopted, known as the *plenum*, consists in forcing fresh air into the building by means of blowers or fans, placed in the air ducts.

**Ventilation of Schools.** The heating and ventilating system of the modern schoolhouse in large towns and cities is usually of the standard degree of efficiency, but many schools in rural districts and villages are built without any special devices for securing the admittance of fresh air and the escape of foul air. Pupils who must study for any length of time in a poorly ventilated room become drowsy, restless, and inattentive; it is one of the teacher's most important duties to see that unwholesome conditions do not prevail in her room. The simplest device for securing proper ventilation is a board about eight inches wide, fitted to the casing under the lower sash. When the window is raised, the board will force the air upward and prevent its blowing directly on any of the children. During recess and intermissions, the room should be thoroughly flushed with fresh air.

**Recirculated Air.** Modern investigations have shown that the chief needs in ventilation are to keep air constantly in motion and pre-

vent its becoming too dry or too hot. In some institutions, the air is circulated over and over again, but is constantly washed by being sent through a spray of water which takes out all dust and foul matter, and moistens it. The air which is used for ventilation is drawn by a centrifugal fan over steam coils, then passed through an air washer for cleaning and humidification, and is finally forced back into the room. Air is withdrawn and discharged by an exhaust fan. Such systems of ventilation result in a great saving in fuel in winter, and seem to meet all the requirements of health, especially when a small amount of outdoor air is constantly mixed with the recirculated air. In summer, cool air can be circulated by supplying refrigerated air to the air washer.

A.S.A.

**HEAT LIGHTNING.** See LIGHTNING.

**HEAT STROKE.** See SUNSTROKE.

**HEAT VALUES OF FUEL.** See FUEL, subhead.

**HEAVEN,** *hev' n.* In religion the word applies to the region where God's immediate presence is manifested and where the angels reside. Among Christians, the general belief since the Resurrection of Christ has been that all who live good, pure lives on earth, and have accepted Christ as a personal Saviour, go to heaven after death. It is the place of everlasting life, and its joys are purely spiritual. Where this region is no one knows, although the expression of Jesus, "The kingdom of heaven is within you," has led to the idea that heaven is in reality a pure, spiritual condition of mind.

**Various Conceptions of Heaven.** Almost every religion and race of men has conceived what was to it an ideal environment for a future life, and each group has pictured a place having none of the disadvantages and all of the advantages of its own surroundings. The Eskimo places heaven in the warm earth, and hell in the cold sky; the American Indian pictured a prairie-heaven, a "happy hunting ground" full of bison. Heaven to the ancient Hebrews was a city on a height, walled off from desert nomads; desert peoples in general conceive of heaven as a delightful, well-watered oasis, and forest-dwellers think of it as a place of no heat and no mosquitoes, without the hardships of a forest life.

**HEAVES,** *heevz*, commonly known as BROKEN WIND, is a disease to which horses are subject. It is chiefly characterized by difficulty in expelling air from the lungs, and becomes very marked during exercise. Air is easily inhaled, but is forced out with heavings of the stomach muscles and general signs of distress. The nostrils become dilated, the eyes bloodshot, and the victim becomes incapable of long-continued effort. Although it affects the lungs, the disease probably arises from stomach disorders which act upon the nerves of the lungs. Heaves may be prevented by

careful supervision of feeding habits. Horses should not be allowed to overload the stomach with coarse, bulky foods, nor be permitted to work too soon after a heavy meal. When heaves has been contracted, the symptoms may be alleviated by moistening the feed with limewater, and giving the animal a diet suited to its condition. A veterinary doctor should direct the treatment.

**HEAVYSEGE,** *hev' ih seej*, CHARLES. See CANADIAN LITERATURE (English Canada: Poetry).

**HEBE,** *he' be*, in Grecian mythology, the goddess of youth, who poured out the nectar with which the gods pledged each other. One day, upon a solemn occasion, she tripped and fell. Then she was forced to resign her office, while her father, Jupiter, went in search of another cupbearer, finally kidnaping the beautiful youth Ganymede for the office. Hebe always retained the power of restoring the aged to the bloom of youth and beauty, and some accounts say that it was only after she became the wife of Hercules, who was deified, that she gave up her office of cupbearer. She even succeeded in reconciling her mother, Juno, to Hercules, who had suffered all his life from the hatred of the queen of the gods.



Haste thee, Nymph, and bring with thee,  
Jest and youthful Jollity,  
Quips, and Cranks, and wanton Wiles,  
Nods, and Becks, and wretched Smiles,  
Such as hang on Hebe's cheek,  
And love to live in dimple sleek;  
Sport that wrinkled Care derides,  
And Laughter holding both his sides.

—MILTON: *L'Allegro*.

[See GANYMEDE, and the deities mentioned above, in their alphabetical places in these volumes.]

**HEBER, REGINALD** (1783-1826), a bishop of the English Church, and a famous author of hymns. He wrote the great missionary hymn, *From Greenland's Icy Mountains*, which is said to have been translated into more languages than any other religious song. The gift for versification showed itself early in Heber's life. His prize poem *Palestine*, written at Oxford, owed one of its most striking passages to Sir Walter Scott's suggestion, and has won a permanent place in poetic literature.

When he was forty years of age, Heber was called to the bishopric, and his literary life was closed. He was one of the first bishops that the English Church sent to Calcutta, India, and he baptized the first native to embrace Christianity. See HYMNS AND HYMN TUNES.

**Other Hymns.** Among Heber's other hymns, as inspiring to-day to the Christian world as when they were written, are *Holy, Holy, Holy, Lord God Almighty; Creator of the Rolling Flood; Lo, the Lilies of the Field; There was Joy in Heaven; O, King of Earth and Air and Sea;* and *The Son of God Goes Forth to War.*

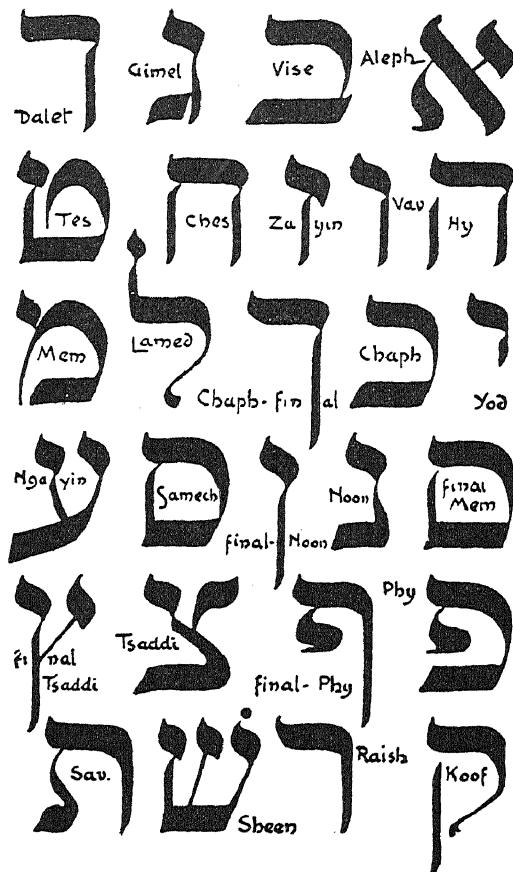
**HEBREW, *he' broo*, LANGUAGE AND LITERATURE,** the spoken and written language of the Hebrews during the greater part of their existence in Palestine. Revived at various epochs in the history of the Jews, this language survives to the present day. Hebrew belongs to the group known as the Semitic languages, and has all the characteristics of the group. The alphabet, just as the old Canaanitish or Phoenician, is composed of twenty-two consonants. The vowels are expressed by marks above or below these letters. The present form of Hebrew is a modification of the old Phoenician characters. The writing, as in the case of most Semitic languages (not of all), is from right to left, opposite that of the method employed in English.

**History.** The history of the Hebrew language and its literature may be divided into four periods. First was the *Biblical period*, extending roughly from 1000 B.C. down to the threshold of the present era. Up to the time of the so-called Babylonian Exile (685 B.C.), Hebrew was the common language of speech and writing, and this language was identical with the tongue spoken by the Canaanites at the time that the Hebrews invaded the country and gradually drove the Canaanites out of their possessions. After the Exile, *Aramaic*, closely allied to Hebrew and yet a distinct language, became the current medium of communication, while Hebrew became more a learned and a classical language, the language used in the cult and in religious literature.

The second period may be called the *Rabbinical*, because of the predominance of the rabbi as the priestly guide of the people. The great production of rabbinical Judaism was a vast collection of laws and commentaries known as the *Talmud*. In this compilation, the laws themselves, known as the *Mishna*, were written in Hebrew, whereas the commentaries (*Gemara*), representing discussions of the rabbis on the laws, were in Aramaic, the current speech even among the learned classes. Besides the *Mishna*, there are great collections of homiletical expansions of the Biblical books, corresponding in a measure

to modern sermons, which were likewise written in Hebrew. This second period extends to about the seventh century.

The spread of the Mohammedans through the East and into Western Europe caused



THE HEBREW ALPHABET

Arabic to supplant Hebrew as a spoken language among the masses of the Jewish people.

During all this period, however, Hebrew never died out as a classical language, for it was spoken, at least by the educated, among the Jews in all lands, and, with the check to the further extension of Mohammedanism and the spread of the Jews to such lands as France, Germany, England, and Holland, which were not touched by the Mohammedan movement, it was not long before the use of Hebrew as a medium of communication between Jews of various lands naturally led to renewed interest in the old historical speech.

The *third period* in the history of Hebrew extends from the Middle Ages down to the end of the eighteenth century. Most of the literature produced in this period was of a

theological character—commentaries and super-commentaries on the Old Testament, and on the *Mishna* and *Gemara*, ritual compilations, grammatical works, religious and, to a limited extent, secular poetry. With the gradual liberation of the Jews in the countries of Europe, through the growth of democracy, Hebrew was replaced largely by the languages spoken in the countries in which Jews lived. It was natural that, even during the centuries when the Jews of Europe had no rightful citizenship, they had adopted, for purposes of ordinary intercourse, the languages spoken in European countries. Now, with the advent of a new era, the language of the country became also the literary medium, and Hebrew retained its place only as the language of the ritual in the synagogues.

Within our own days, however, there has been a renewal of interest in Hebrew as current speech, which marks, therefore, the *fourth period* in the history of the language. That revival began in Russia a few decades ago, and has been largely aided by the spread of the Zionist Movement (which see). It is doubtful whether Hebrew will gain any foothold in Western or Southern Europe or on the American continent, where Jews take on the color of the life about them.

Naturally, the most valuable section of Hebrew literature is that comprised in what is called the Old Testament. This collection, divided conventionally into thirty-nine books, embodies the early myths, the early and later traditions, and the historical records of the Hebrews down to the period of the Exile; the orations of the great Hebrew prophets, extending from the ninth century B.C. to the end of the fifth century; a great collection of religious poetry; and such individual books as the *Song of Songs*, *Ruth*, *Lamentations*, and *Ecclesiastes*. A small section of the Old Testament is written in Aramaic, such as large portions of the book of *Daniel* and portions of the books of *Ezra* and *Nehemiah*. These productions, for this reason alone, belong to the post-Exilic period. The oldest specimens of Hebrew literature are the poetical bits in the Pentateuch and in some of the historical books, such as the "Song of Lamech," at the end of the fourth chapter of *Genesis*, the "Song of the Well" and martial ditties in the book of *Numbers* (chapter *xxi*), and the "Song of Deborah," in the fifth chapter of *Judges*. None of these productions, however, is older than 1000 B.C., while a great bulk of the Old Testament literature dates from the eighth century to the end of the Babylonian Exile, and a century or so beyond that epoch. See *BIBLE*; *JEWS*.

**HEBREWS.** See *JEWS*; *JERUSALEM*; *BIBLE*.

**HEBREWS, EPISTLE TO THE**, one of the books of the New Testament. It is a letter

addressed to certain Jewish Christians who were in danger of returning to Judaism. The author exhorts them to hold fast to their new faith, to which they were early converts, urging the thought of the High Priesthood of Jesus as replacing the Jewish priestly system. The letter, although addressed to a particular church, is a general appeal to the Hebrews to press on to the fullness of spiritual growth, since it is "by His faith that the righteous shall live." The authorship of the book has been much disputed; it has been attributed to Barnabas, Apollos, and others; the current view is that it was written by the Apostle Paul cannot be traced back further than the fourth century.

**HEBRIDES**, *heb' rih deez*, the "Western Isles" off the west coast of Scotland. This island-group long possessed a peculiar interest, be-



THE HEBRIDES

cause of the primitive customs and manner of life which prevailed after the neighboring regions became modernized. In all, there are over 500 of these islands, but some of them are mere dots on the surface of the ocean, and fewer than one-fourth are inhabited. The total area is 2,812 square miles, over two and a half times that of Rhode Island, and the population is about 80,000. Geographically, the islands are classified in two groups, the Outer and the Inner Hebrides; politically, they are divided among the four Scottish counties of Argyll, Bute, Inverness, and Ross. Best known, perhaps, of the individual islands is Skye, far-famed for the little, long-haired

Skye terrier, which originated there and was named for the island.

The people are not Scots, but are a more primitive people, who speak Gaelic and have only in recent years come into any real contact with the rest of the world. Though the islands have belonged to Scotland since 1266, small attention was ever paid to them, and they were not well known until Samuel Johnson visited them in 1773 and roused interest in them by his *Journey to the Western Isles*. Later, Sir Walter Scott cast a glamour about them by his *Lord of the Isles*. To-day tourists flock to the Hebrides to enjoy the scenery, the climate, and the picturesqueness of the people, no longer so unconscious as formerly, but of interest still. The air is damp, but the climate, which is surprisingly mild because of the influence of the Gulf Stream, is very healthful. Sheep, cattle, and horses, all of the smaller breeds, thrive on the pasture lands. On the cultivable land, which includes less than one acre in seven, are grown barley, potatoes, and the oats which are so inevitable in Scotland. See JOHNSON, SAMUEL.

**HEBRON**, *he' brun*, one of the cities of Refuge (which see); see, also, PALESTINE (Cities).

**HECATE**, *hek' a te*, a goddess in Greek mythology, frequently represented as having three heads, or three bodies, with serpents around her neck and shoulders. She had the power to bestow or withhold at pleasure the blessing of wealth, victory, wisdom, and good luck to mortals, and was the only goddess who retained power under the rule of Zeus. She was subsequently confounded with several other divinities, such as Ceres, Diana, and Proserpina, and at last became a mystic goddess, having all the powers of Nature. Magicians and witches claimed her as their infernal goddess. Offerings of dogs, honey, and eggs were made to her at places where three roads met.

**HECATE STRAIT**. See QUEEN CHARLOTTE ISLANDS.

**HECATOMB**, *hek' ah tom*, the name of an ancient Greek sacrifice of a hundred head of oxen, is derived from *hekaton*, meaning *one*

*hundred*. In the time of Homer, it was customary to burn the legs, wrapped up in fat, and certain parts of the intestines, the rest of the animal being used, after the sacrifice, for a festive meal. The word was extended to mean the sacrifice of a large number of victims, but not necessarily one hundred.

**HECKER, ISAAC THOMAS**, founder of the Paulists (which see).

**HECKLE**. See FLAX.

**HECLA**, *hek'-lah*, a variant of Hekla (which see).

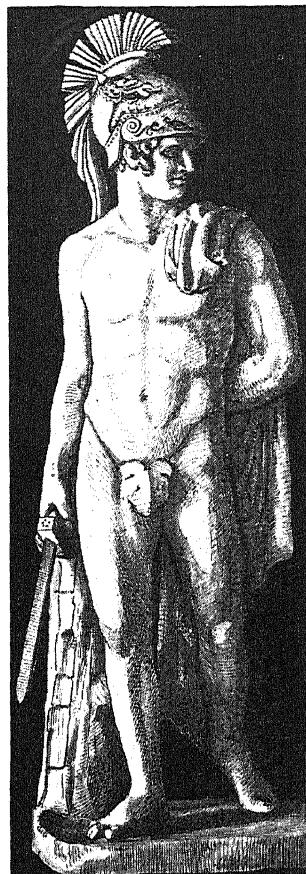
**HECTARE**, *hek'-tair*, a variant of *hektares*. See METRIC SYSTEM.

**HECTOGRAPH**, *hek' to graf*, a pad composed of gelatin and glycerin, and used for making many impressions of writing or drawing. This pad is made in the proportions of one ounce of gelatin to six and one-half ounces of glycerin.

These two ingredients should be allowed to mix by heating slowly for a number of hours over a vessel filled with hot salt water. When thoroughly melted, the mixture is poured into a long, shallow pan and allowed to harden, when it will present an even, smooth surface. A special copying ink is needed, which can be purchased at a stationery store. The matter to be copied is written and placed face downward on the pad; after a short period the imprint of the writing will be transferred to the pad. About 100 copies may be made by placing blank paper over the tracings on the pad and gently rubbing, to effect a transfer of the impression. The cost is little, if made at home, for it includes simply that



THE TRIPLE-HEADED HECATE  
From a statue in Rome.



Write on your doors the saying  
wise and old,  
“Be bold! be bold!” and every-  
where—“Be bold!  
Be not too bold!” Yet better  
the excess  
Than the defect; better the  
more than less;  
Better like Hector in the field  
to die,  
Than like a perfumed Paris turn  
and fly.

—LONGFELLOW.

[See HECTOR, page 3124.]



From painting by Maignon

Photo: Visual Education Service

## PARTING OF HECTOR AND ANDROMACHE

of the pan, glycerin, gelatin, and copying ink.

**HECTOR**, probably the most attractive character in the *Iliad*; in Greek mythology, the most valiant of the Trojans, whose forces he commanded. He engaged the Grecian heroes in conflicts and often gained advantage over them. When he was present, Troy was unconquerable, but when he killed Patroclus, the friend of Achilles, the latter slew him and dragged his body about the walls of the city at his chariot wheels. Priam, the father of Hector, afterward got possession of the body and gave it solemn burial. In the sixth book of the *Iliad*, Hector's leave-taking of his wife, Andromache, and his departure to meet Achilles for the last time, are the finest episodes described therein. (See illustration, page 3123.)

**Related Subjects.** The reader will find supplementary information in the following articles in these volumes:

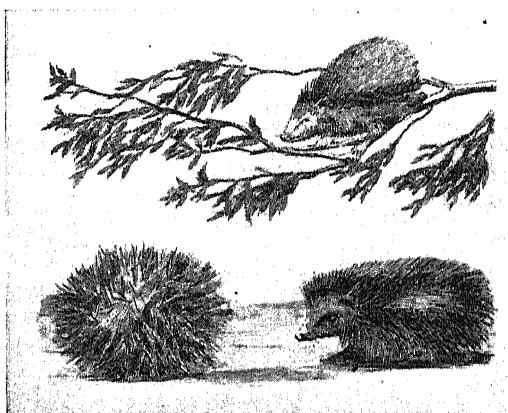
|            |       |                   |
|------------|-------|-------------------|
| Achilles   | Iliad | Priam             |
| Andromache | Paris | Troy (Trojan War) |

**HECUBA**, *hek' u bah*, in Greek mythology, the second wife of Priam, king of Troy, and, according to Homer, mother of nineteen of Priam's fifty sons. In the overthrow of Troy, Priam was slain, and Hecuba was given as a slave to Odysseus (Ulysses). According to one form of the legend, Hecuba, in despair, leaped into the Hellespont. See **PRIAM**.

**HEDGE BINDWEED.** See **BINDWEED**.

**HEDGEHOG**, *hej' hog*, one of a genus of small mammals somewhat similar to the

porcupines in appearance, but not in habits. Hedgehogs feed on insects and so are placed in the order *Insectivora*; porcupines eat vegetable matter and are in the same order as squirrels, rabbits, and rats. No hedgehogs are found in the western hemisphere. Porcupines



THE HEDGEHOG

live in the forests of both the Old and the New World.

The common hedgehog is native to Europe and Western Asia. It is about nine inches long, and has very short ears and a long nose, which it uses in rooting for ants and other insects. The stiff hair on its back is extended into short,

strong spines, much thicker than those of the porcupine. There is a covering of short fur on the under part of the body. When alarmed or attacked, the hedgehog curls itself up, transforming itself into a ball with an armor of sharp brown spikes. The longer the need for defense, the tighter the ball becomes. The animal feeds at night, eating snakes, small quadrupeds, birds and birds' eggs, as well as insects. It is easily tamed, and is sometimes encouraged to stay in houses to rid them of cockroaches and other pests. At the beginning of cold weather, the hedgehog crawls into a hole and starts a long winter sleep. It belongs to one of the oldest living genera of mammals. L.H.

**Scientific Name.** The hedgehogs belong to the family *Echinaceidae*. The common hedgehog is *Erinaceus europaeus*.

**Related Subjects.** The reader is referred in these volumes to the following articles:

Hibernation  
Insectivora

Porcupine  
Rodents

**HEDIN, heh deen'**, SVEN ANDERS (1865-), a Swedish explorer, famed for his researches and observations in parts of Asia which had not been previously studied in detail by geographers. His early expeditions took him into East Turkestan, the Pamir, Northern Tibet, Mongolia, and Siberia, and the results of his studies were published in 1899 in a volume entitled *Through Asia*. Of still greater import was a journey to Tibet in 1906-1908, for on this expedition he collected data that made possible the first detail map of that portion of the Asiatic continent. Hedin received many honors, including election to the Paris Academy of Sciences in 1911, and enrollment in the Swedish nobility in 1912. Late in 1914 he was asked by former Emperor William II to visit Belgium for the purpose of studying the effects of the German invasion of that country. In 1923 Hedin made a trip around the world, passing through the United States, Mongolia, and Russia. In 1929 he was forced to return home from an expedition into Turkestan, because of ill health.

**HEDJAZ, heh jahz'**, a variant of Hejaz (which see).

**HEDONISM, he' don iz'm**, the teaching that pleasure is the chief good, a doctrine formulated by Epicurus (which see) into an ethical theory. The term is derived from a Greek word meaning *to take pleasure*. One view of hedonism applies to an individual, and another to the happiness of the masses or society. Epicurus represented the former view. The latter idea is expressed in our modern expression, *utilitarianism* (which see).

**HEDWIG**, queen mother of Charles X. See CHARLES (X, Sweden).

**HEEL-FLY.** See BOTFLY.

**HEGEL, ha' gel**, GEORG WILHELM FRIEDRICH (1770-1831), a German student of mental phenomena, the last of four great writers (the others being Kant, Fichte, and Schelling) who during their age developed the idealistic philosophy of Germany. At one time, so great was Hegel's influence that he was said to have been the philosophical dictator of Germany. He was a native of Stuttgart, and was educated at the University of Tübingen. For many years he taught at the universities of Jena and Heidelberg, and later accepted the professorship of philosophy at the University of Berlin.

**His Philosophy.** Hegel maintained that the world of objects is not only related to an intelligence, but that it can be nothing but the revelation or manifestation of intelligence. He connected his idealistic or spiritual view of things with the modern idea of evolution or development (see EVOLUTION). His philosophy divides itself into three departments—*logic*, or the science of thought in its pure unity with itself; the *philosophy of nature*, in which the ideal principle, supposed to exist in all things, is shown to underlie even the external things of the material world; and the *philosophy of spirit*, which concerns the life of man as a self-conscious being in his relation to a material world. The ideas of Hegel still retain their power, and form one of the most important elements in modern culture. See METAPHYSICS.

**Hegel's Works.** His most important books are *Logic*, *The History of Philosophy*, *The Philosophy of Religion*, and *The Philosophy of Art*.

**HEGIRA, hej' ih rah**, also spelled HEJIRA, a word derived from the Arabic, meaning *going away*, commonly applied to the flight of Mohammed from Mecca to Medina, Friday, July 16, 622. Mohammed had to face danger and much opposition in trying to persuade his countrymen to give up the idolatry that was carried on in Mecca, and he was forced to flee for his life to Medina, in Arabia, which was thereafter known as "the Prophet's city." The followers of Mohammed, all over the world, date their years from his flight, as Christians date their calendar from Christ's birth.

The Caliph Omar instituted the new Moslem calendar in 639 or 640, to begin with the first day of the month in which the flight took place.

**Related Subjects.** The reader is referred in these volumes to the following articles:

|          |        |               |
|----------|--------|---------------|
| Calendar | Mecca  | Mohammed      |
| Epoch    | Medina | Mohammedanism |

**HEIDELBERG, hi' del burg.** See GERMANY (Principal Cities).

**HEIDELBERG UNIVERSITY**, the oldest in Germany, was founded in 1386. It comprises faculties of theology, law, medicine, and philosophy, and has over 200 professors and

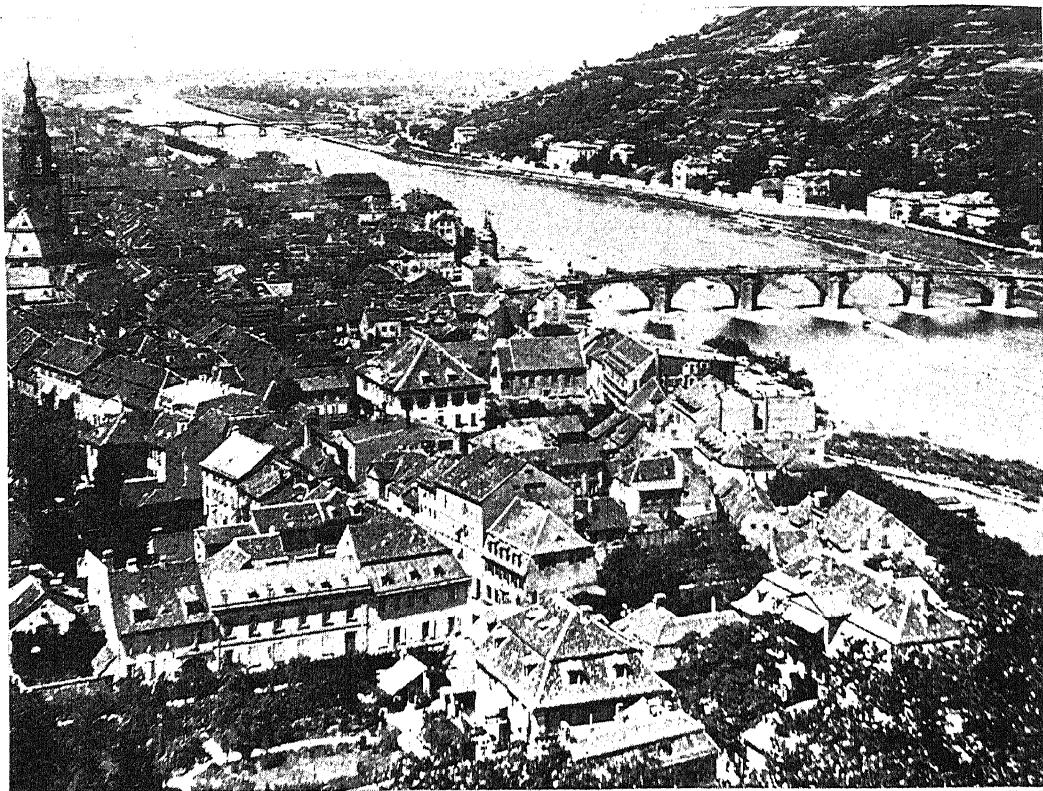


Photo: U &amp; U

HEIDELBERG, SEAT OF THE UNIVERSITY

lecturers. Its students number about 2,500; of these over a hundred every year are Americans. Many of Germany's most famous scholars have been professors here.

Heidelberg was originally modeled after the University of Paris, and at first was a Catholic institution. After the Reformation, it became the stronghold of Protestant learning. In 1802 it was reorganized on a larger scale, and since then has become one of the world-famous universities. The following is the beginning of its famous college song:

Old Heidelberg, thou fair one,  
Thou City rich in lore;  
The Neckar nor the Rhine vale  
Have cities honored more.  
Belov'd by gleeful comrades  
With Wisdom filled and Wine;  
Thy river's glist'ning waters  
Shine forth like radiant eyes.

**HEIFETZ**, *hi' fētz*, JASCHA (1899- ), a Russian violinist, born at Vilna. His musical career has almost paralleled his life-history, for this remarkable musician was studying the violin at the age of three, and at five he became a pupil at the Imperial School of Music, Vilna. After his graduation, three years later, he began to study under Professor Leopold Auer, at Saint Petersburg (now Leningrad).

During his years of instruction, Jascha made occasional public appearances, his first being a performance of a Mendelssohn concerto, when he was six years old. At the age of thirteen, he made a Berlin début that brought him international fame. Success followed success, in Europe, Australia, and America, and in 1926 he received from France the decoration of Chevalier, Legion of Honor. Heifetz is regarded as the equal of any violinist the world over, in technique, beauty of tone, and in artistic interpretation. In 1928 he married Florence Vidor, a moving-picture actress. He maintains a home at Narragansett Pier, R. I.

**HEIGHT AND WEIGHT TABLES.** See **OBESEITY**.

**HEIGHT OF LAND.** See **CANADA** (Physical Characteristics of the Dominion: Eastern Canada).

**HEIGHTS, OR PLAINS, OF ABRAHAM.** See **MONTCALM DE SAINT-VERAN**; **QUEBEC**; **BATTLE OF**; **WOLFE, JAMES**.

**HEILPRIN**, *hyle' prin*, ANGELO (1853-1907), a naturalist and traveler, one of America's leading authorities on the subjects of geography and geology. Heilprin was born in Hungary, but emigrated to America with his parents when three years of age. He completed his education in Europe, studying in

London, Geneva, and Vienna. In 1892 he led the Peary relief expedition to Greenland. After the eruption of Mount Pelée, in 1902, he made two journeys to the island of Martinique and climbed to the crater many times while the volcano was in eruption. One of the greatest services he rendered was in connection with the editorship of Lippincott's *Geographical Gazetteer*.

**His Writings.** Among Heilprin's best known works are *The Geographical and Geological Distribution of Animals*, *The Earth and Its Story*, and *Alaska and the Klondike*.

**HEIMDALL**, *haym' dahl*, in Norse mythology, the guardian of the bridge of the gods against the attacks of the giants. According to the popular legend of the Northland, he could see as well by night as by day, could hear the grass grow, and required very little sleep.

**HEIMIN**, *ha' min*, the lower classes in the population of early Japan. See JAPAN (History, The Middle Age).

**HEINE**, *hi' ne*, HEINRICH (1799-1856), the keenest satirist in German literature after Goethe, and one of the most gifted poets of his century. The very embodiment of the restless, discontented age, he was one of the most important influences in modern German letters, and an example of a splendid genius not backed by strength of character. Heine was born at Düsseldorf and studied law at Bonn and Berlin. In order to practice his profession, he was compelled to renounce his Jewish faith. His revolutionary tendencies, and especially his open hero worship of Napoleon, made him so unpopular in Germany that he was obliged to remove to Paris, where he was well received and where he remained until his death.

**His Works.** Nearly all his writings are either lyrical, autobiographical, journalistic, or controversial. His *Book of Songs* contains some of the choicest gems of lyric poetry, many of which were set to music by Schumann and Mendelssohn. A vacation trip through the Harz Mountains was the inspiration of his famous *Harz Journey*, the first of his series of *Travel Pictures*. These are made up of biographical comments, satires, and religious and political discussions. During his last years, when helpless with paralysis, he continued to work; no bodily suffering could break his creative power, and he wrote and jested to the last. During these years of pain, he published his *New Songs*, a satirical political poem entitled *Germany*, and three volumes of *Miscellaneous Writings*.



HEINE

**HEIR**, *air*, refers in law to a person entitled to lands, tenements, or other real property of a deceased person. An *heir presumptive* is one who would inherit if his ancestor were to die at that particular time, but whose right of inheritance might later be defeated by some nearer heir afterward born. An *heir apparent* is one whose right of inheritance is certain, provided he outlives his ancestor as the eldest son. *Heirlooms* are such personal belongings as go to the heir along with the inheritance, and not to the executor of the deceased. See REAL ESTATE; PERSONAL PROPERTY.

**Derivation.** The word is derived from the Latin *heres*, which means one entitled to inherit.

**HEJAZ**, OR **HEDJAZ**, *heh jahz'*, a small kingdom which attained independence during the World War, then lost its freedom to a neighboring sultan. It is geographically a part of the peninsula of Arabia, with the Red Sea for its western boundary, Palestine at the north, the Arabian desert forming an uncertain boundary line at the east, and with the unimportant principality of Asir on the south. The country has an estimated area of 170,000 square miles and a population of about 900,000.

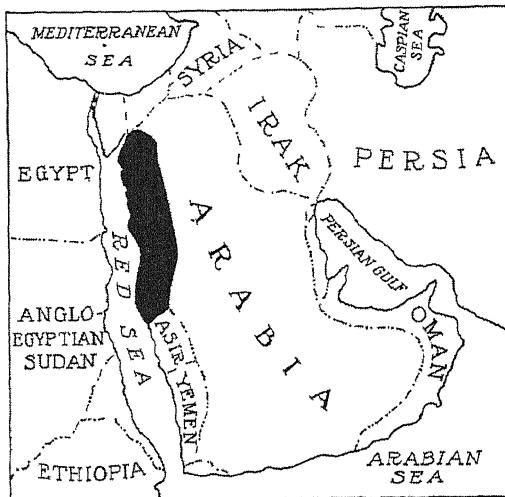
Although it is a country of excessive heat and of semi-desert and tropical grasslands, there are regions in Hejaz where large crops can be cultivated. In the oases, dates are the principal product; in the plateau regions, grains, coffee, and tobacco are raised. Camels and horses are the chief animals; the famous Arabian horses are bred in large numbers for export.

The majority of the people of Hejaz are Arabs, yet, as a result of the age-old native caravan traffic between Arabia and Indian and African shores, there are numerous negroes and British Indians. Within recent years, the patriarchal tribal organization of the nomadic peoples has given way to some extent to commercial organization, and agriculture has benefited by this tranquilizing of the people. Though a large number of the inhabitants still follow the roving life of their ancestors, yet there is found every degree of transition from the purely nomadic life to the highly developed, though simple, civic life of the greater towns.

The chief importance of Hejaz, it has been said, is due to its two historic holy cities, Mecca and Medina. Mecca, with 60,000 inhabitants, is the capital and the birthplace of Mohammed. To this city, as many as 200,000 persons have journeyed in a year to visit the Great Mosque, containing the sacred shrine, the Kaaba. Medina is more important to-day as the burial place of Mohammed, who died there in A.D. 632, than as the second city of Hejaz; it has a population of 40,000. Jeddah, the leading commercial city because

it is the seaport of Mecca, has a population of about 20,000.

**History and Government.** Hejaz was an Arabian province until 1258, when it fell under Egyptian dominion. Although Egypt became



LOCATION MAP

Hejaz is shown in solid black.

a dependency of the Ottoman Empire, Hejaz remained under Egyptian suzerainty until 1845, when its administration was taken over by Constantinople. Hejaz was then constituted a vilayet (Turkish province) under a wali (governor-general).

The completion of the Hejaz railroad to Medina, in 1904, strengthened Turkish control, especially in the northern part of the vilayet. Resistance against the Turkish government began in 1908, when Husein, amir of Mecca, attempted to prevent the extension of the railway to Mecca. But it was not until the World War (1916) that Husin denied further allegiance to the sultan and proclaimed himself king. Hejaz then joined the Allies in the war, later was represented at the Peace Conference, and in 1920 Husein saw his country admitted to the League of Nations.

In March, 1924, he had himself proclaimed Caliph of Islam, an act which aroused the displeasure of I'bn Saud, the sultan of Nejd. This ablest of all Arabian rulers began in August, 1924, an invasion of Hejaz, which ended in the abdication of Husein as king and caliph, and the capture of the cities of Taif, Mecca, Medina, and Jeddah. In Mecca, on January 11, 1926, I'bn Saud was proclaimed king of Hejaz and sultan of Nejd. As sultan-king, I'bn Saud devised for Hejaz a viceregal government, and established his son, Faisal, as viceroy, with a central council and local councils.

B.M.W.

**Related Subjects.** As the recent history of Hejaz is so closely linked with that of Nejd, see article NEJD for a fuller understanding of these two countries. See, also, the following.

|                      |               |
|----------------------|---------------|
| Arabia               | Medina        |
| Caliph and Caliphate | Mohammed      |
| Caravan              | Mohammedanism |
| Kaaba                | Nejd          |
| Mecca                | Turkey        |

**HEKLA, OR HECLA,** *hek' lah*, a volcanic mountain in Iceland, rising 5,102 feet, and located twenty miles from the coast. It is composed of basalt, lava, ashes, and other loose volcanic matter, has five craters, and is perpetually snow-clad. Since the tenth century it has been in eruption forty-three times, the most terrific disturbance occurring in 1783, when the stream of lava discharged was forty-five miles long and fifteen miles wide. In 1845 it again became active, and continued for fifteen months to erupt from three craters. The last outburst occurred in 1878. See ICE-LAND.

**HEKTARE,** *hek' tair*. See METRIC SYSTEM.

**HEKTOGRAM.** See METRIC SYSTEM.

**HEKTOLITER.** See METRIC SYSTEM.

**HEKTOMETER.** See METRIC SYSTEM.

**HEL, OR HELA,** *hel' ah*, in Norse mythology, the goddess of the region of the dead, or Niflheim. She was the daughter of Lok and the giantess Angurboda, and her dwelling was under a root of the sacred ash tree Yggdrasil. In the Middle Ages, she was confused with the kingdom over which she ruled, but in later mythology is represented as being half blue-black and half flesh color, and of extremely repulsive appearance. Her kingdom was peopled only by those who died of disease and old age. See LOK; YGGDRASIL; NIFLHEIM.

**HELE,** *ha' le*, OR **HENLEIN,** *hen' lin*, PETER, inventor of the watch (which see).

**HELENA,** *hel' e nah*, ARK. See ARKANSAS (back of map).

**HELENA, MONT.** See MONTANA (back of map).

**HELEN OF TROY,** the fairest woman of the ancient world, whose name, to every age since her own time, has stood for all that is most beautiful. It was of her that the poet Marlowe wrote:

Was this the face that launch'd a thousand ships  
And burnt the topless towers of Ilium?

According to popular myth, she was the daughter of great Jupiter and Leda, whom the king of all the gods had courted in the semblance of a swan. When but a child, she was so beautiful that Theseus bore her off to be his bride, but she was brought back by her brothers to her Spartan home, and as she grew she so increased in beauty that thirty ardent suitors sought her hand. Proclaiming Menelaus, king of Sparta, as her choice, she bound the other suitors by an oath that they would help

her husband in his need. When Paris, son of Priam, king of Troy, became a guest in Menelaus' home, he pleaded with Helen that



THE ABDUCTION OF HELEN

"Then from her husband's stranger-sheltering home,  
He tempted Helen o'er the ocean's foam"

she go with him back to his father's house, and he won his suit. Some of the legends declare she went willingly, while others assume that

turned to Menelaus, whom she found ready to take her once more as his wife. Their later life in Sparta, their old home, passed happily for them, but all her days were saddened by the thoughts of all the woe which Greece had suffered for her beauty's sake. Back of it all, however, was the jealousy of Juno, who plotted to destroy the Trojans because Paris awarded the golden apple to her rival Venus.

**Literary References.** In poetry her name is often found, and Tennyson, in *A Dream of Fair Women*, described her in these words, which make her beauty and her sadness felt:

At length I saw a lady within call,  
Stiller than chisel'd marble, standing there;  
A daughter of the gods, divinely tall,  
And most divinely fair.

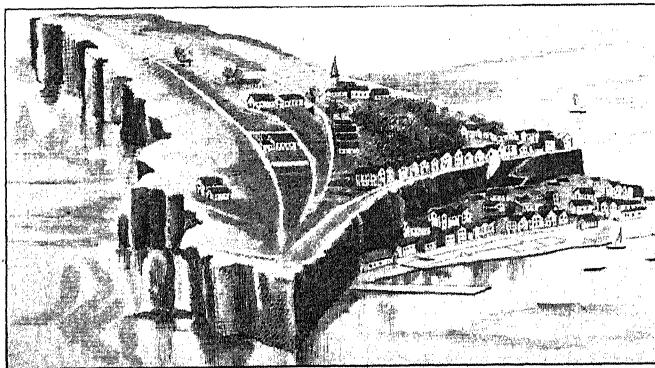
Her loveliness with shame and with surprise  
Froze my swift speech; she, turning on my face  
The starlike sorrows of immortal eyes,  
Spoke slowly in her place.

**Related Subjects.** The following articles in these volumes will be of interest in connection with this great classical story:

Apple of Discord  
Eris  
Menelaus  
Paris (legend)

Priam  
Theseus  
Troy  
Ulysses

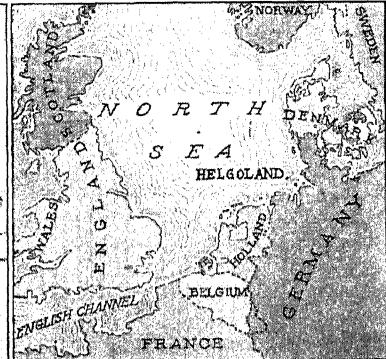
**HELGOLAND**, *hel' go lahnt*, an island in the North Sea, belonging to Germany, now covering an area of only one-fifth of a square mile. It is thirty-five miles from the mouth of the River Elbe and from the entrance to the Kiel Canal. Formerly a summer resort and the home of peaceful fishermen, the island played an important part in the World War. The inhabitants were removed to the mainland at the



THE ISLAND OF HELGOLAND

Paris carried her to Troy by force. Forsaken Menelaus called on all those Grecian chiefs whose sacred oath he held, and they came forward to avenge his wrong. This was the cause of the great Trojan War, the most terrific conflict of legend.

When Troy had fallen, and false Paris, too, the lovely cause of all the loss of life, whose beauty still could drive men to despair, re-

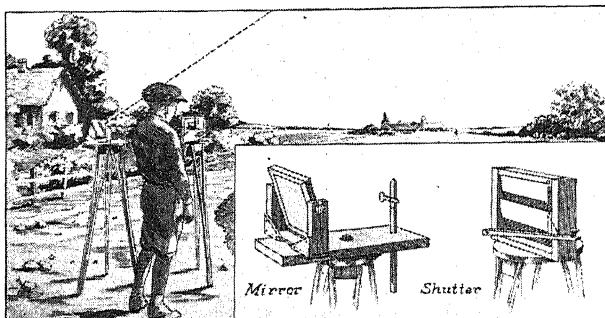


beginning of the war, in 1914, and the island became a naval base. It then bristled with powerful guns, under the protection of which the German fleet might lie in safety. The peace treaty in 1919 ordered the fortifications and sea wall demolished; by 1921 the demand had been complied with (see WORLD WAR).

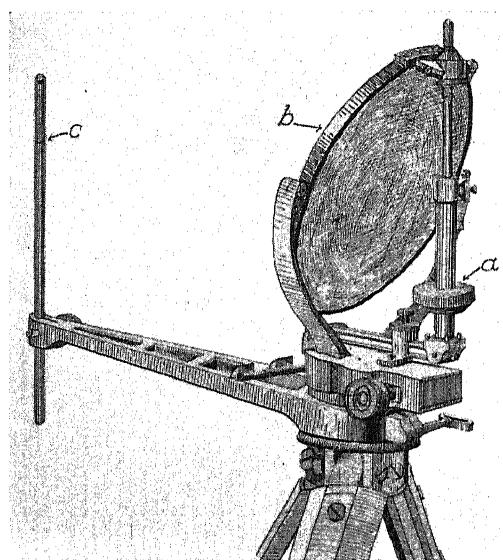
Since then, it has become apparent that un-

less the sea walls are restored, the entire island is doomed to disappear. One-third of it has already washed away; at the same rate of destruction, it may possibly be gone by 1950. The island was ceded to Germany in 1890 by Great Britain in exchange for Zanzibar, on the east coast of Africa, an exchange which Britain later had cause to regret.

**HELICON**, *hel'-i kon*, a mountain range in Boeotia, in Greece, celebrated in ancient days as the seat of the Muses. The highest summit, Mount Helicon (now called Palaeovouno), is 5,738 feet high. Two fabled fountains were here; Hippocrene, one of them, is said to have gushed forth when Pegasus, the winged horse, rushed by. A grove and a temple adorned with statues stood on the eastern slope, and were sacred to the Muses, who were the nine daughters of Zeus. Hesiod, the poet and wan-



HOW A BOY MAY USE THE HELIOGRAPH



THE HELIOGRAPH

dering singer, lived in the village of Ascra, now called Pyrgaki, at the foot of Mount Helicon. See MUSES.

**HELICOPTER**, *hel i kop' tur*. See AIRCRAFT.

**HELIOGRAPH**, *he' lih o graf*, an instrument which "writes by the sun," or signals to distant places by means of sun flashes reflected by a mirror. The distance to which messages may

be sent depends on the clearness of the atmosphere and the size of the mirror used. Under favorable conditions, messages have been flashed more than 200 miles. While it possesses great advantages, it is easily portable and quickly

made ready for use, the heliograph has the disadvantage of being usable only in cloudless weather.

The instrument consists of a mirror glazed with quicksilver, the mirror back being covered with some opaque material (see *b* in illustration), a signaling key, called the *col-*

*lar* (*a*), operated similarly to an ordinary telegraph key; and a sighting vane (*c*). The whole instrument is mounted on a tripod. The Morse code is used, the letters being indicated by long and short flashes produced by pressing and liberating the operating key (see illustration under TELEGRAPH).

The mirror is so adjusted as to produce a flash from the sunlight and to guide it in the required direction, which is ascertained by the sighting vane. See SIGNALING AND SIGNALS.

**HELIOGRAPHIC CHART**. See CHART.

**HELIOPOLIS**, *he le op' o lis*. See OBELISK.

**HELIOS**, *he' le ohs*, in Greek legend, the sun god, child of the Titan Hyperion and the Titaness Theia, and brother of Aurora. At a later mythological period, he lost his vogue, and Apollo became the sun god. According to the myth, Helios dwelt in a magnificent palace in the east, which he left in the morning to pursue his light-giving labors and to which he was conveyed at night in a winged boat of gold. He was widely worshiped, and had temples in Corinth, Argos, Elis, and elsewhere, but more especially at Rhodes. In art he was represented as a beautiful youth with hair unbound and crowned by rays. See APOLLO.

**HELIOTHERAPY**, *he le o thehr' a pih*, a method of curing disease by exposing the bare skin to the rays of the sun. Sun bathing has been practiced from the earliest times, but the scientific phase of heliotherapy dates from 1893, when Dr. Niels Finsen, of Denmark, invented the system of treating cancer and other diseases with decolorized light rays. Early in the present century, natural sunlight came into use, as well as artificial light, and solar rays to-day are being widely used for the cure of tuberculosis, rickets, nervous asthma, and certain skin ailments, and to hasten a return to health in convalescents recovering from infectious fevers. Patients who take sun baths under

professional direction are carefully protected from over-exposure, and their treatment is rigidly supervised. For the use of ultra-violet light in the treatment of rickets, see ULTRA-VIOLET RAYS; RICKETS; HUMAN GROWTH, NEW KNOWLEDGE CONCERNING.

**HELIOTROPE**, the common name of a genus of flowering plants whose blossoms face one direction and are supposed to turn always toward the sun. From this characteristic the genus took its name, which is derived from two Greek words meaning *sun* and *turning*. The heliotropes are admired for the beauty and fragrance of their flowers. The species most widely cultivated is a native of Peru. It is most easily raised from cuttings, and grows from one to two feet high, a shrubby, much-branched plant. The veined, wrinkled leaves are oval-lance-shaped. The sweet, tiny flowers are salver-shaped, and grow in thick clusters. Their color is bluish-purple or pinkish-lilac, and anything having that particular hue is called heliotrope. Perfumes and sachet powders are made from these flowers. B.M.D.

**Scientific Names.** Heliotropes belong to the borage family, *Boraginaceae*. The Peruvian heliotrope is *Heliotropium peruvianum*. *H. curassavicum* is a wild, white-flowered species of the Southern United States.

**HELIOTROPE, OR BLOODSTONE**, a variety of chalcedony, of a deep-green color, usually variegated with blood-red or yellowish spots of jasper. It is hard and translucent, and belongs to the group of semi-precious stones. According to Pliny, the historian, it derived its name from the belief that if the stone were thrown into water, it would change the sunlight falling upon it into a bloodlike reflection. Heliotrope is found principally in India, Siberia, and the Hebrides. Many fine Greek and Roman antiques set with bloodstones are preserved in famous gem collections, and the stone is much used in signet rings. It is the birthstone for March. See BIRTHSTONES. T.B.J.

**HELIUM**, one of the chemical elements, is a colorless gas ideally suited for use in dirigible airships. Its symbol is *He*. Possessing ninety-two per cent of the buoyancy of hydrogen,



HELIOTROPE

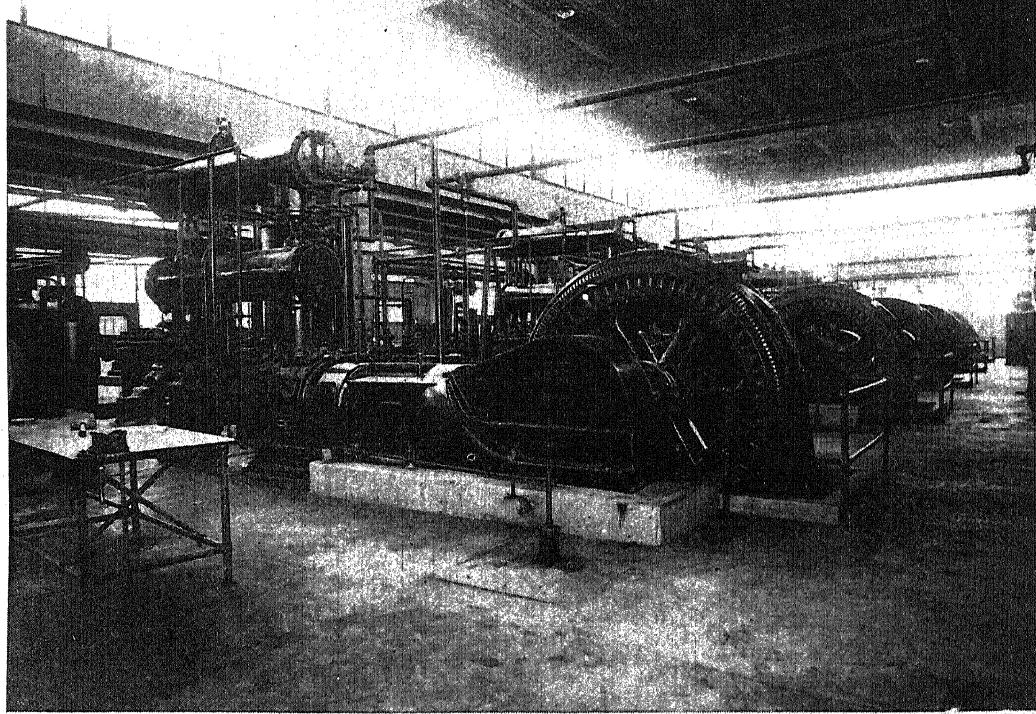
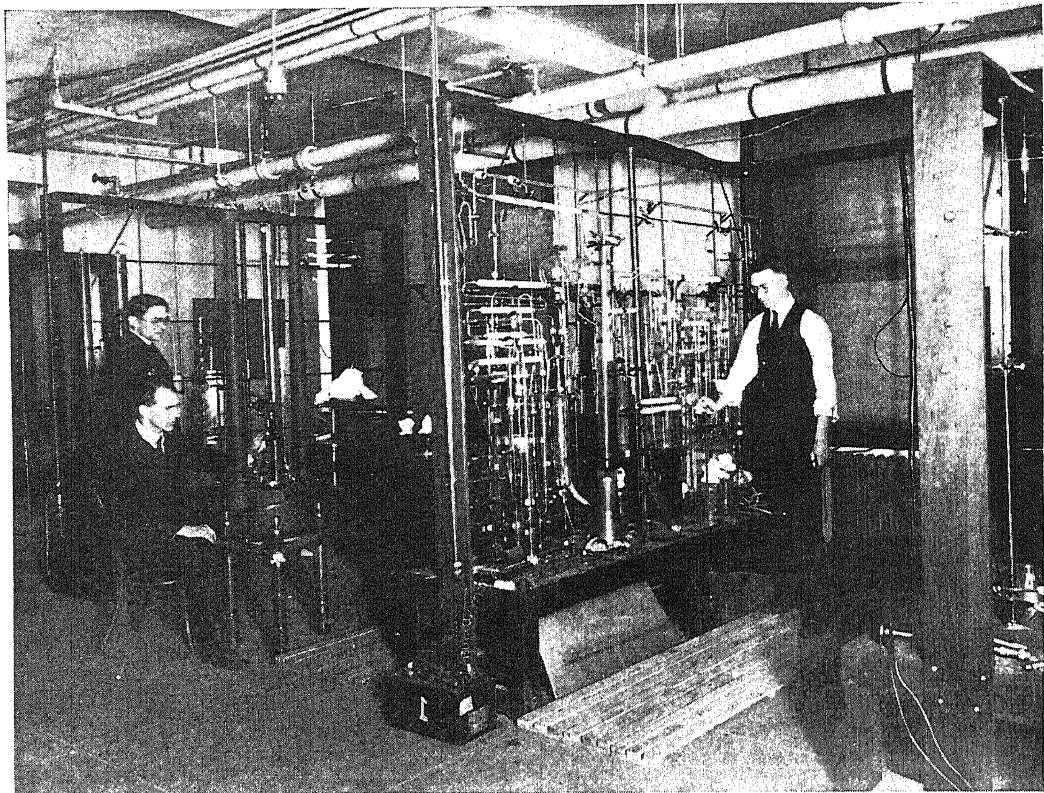
O sweetest of all the flowerets  
That bloom where angels tread!

—STEDMAN: *Heliotrope*.

the only substance known to be lighter, and lacking absolutely the inflammable and explosive character of the latter, helium eliminates most of the danger attending the use of airships of the balloon type. It was not in general use during the World War, because American ingenuity did not discover a practicable method of producing it until just before the war closed. Even then, the cost of its production would have been thought prohibitive, had it not been for the urgency of the crisis. Before the war, helium cost from \$2,000 to \$3,000 a cubic foot. Within a decade after the war, it could be produced for three cents a cubic foot, about ten times the cost of hydrogen. There is no comparison between them, however, when the relative safety of the two gases is considered; even the superior lifting power of hydrogen is overshadowed by its dangerously explosive properties. Helium cannot burn, because it is inactive. It cannot unite with oxygen or any other element.

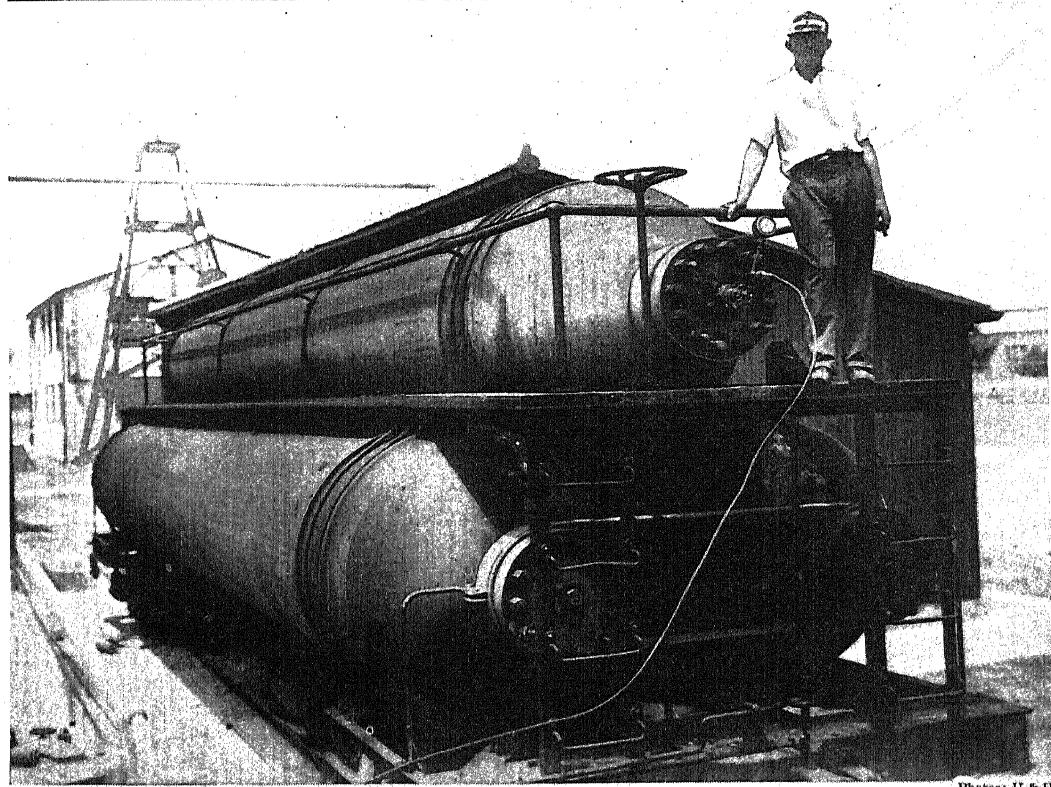
Helium (from the Greek word *helios*, meaning *sun*) was so named because it was discovered, by spectroscopic methods, in the sun's atmosphere, during an eclipse viewed in India in 1868. In 1895, in the course of an experiment with the mineral uraninite, Sir William Ramsay isolated an inert gas which showed the bright-yellow spectral line observed in 1868. He was convinced that this was the element reported at the time of the eclipse, and gave it the name previously suggested for it.

When liquefied under great pressure, helium develops the lowest temperature of any known substance—45° below zero F., only five degrees above absolute zero. This gas is in constant formation as radium and radioactive minerals decompose, and it is present in the earth's atmosphere and in gases of mineral springs. For production on a large scale, it is obtained from a certain kind of natural gas, of which the United States has practically a world monopoly. The area of helium-bearing gas is found in Texas, Oklahoma, Southeastern Kansas, Southeastern Illinois, Indiana, Ohio, Pennsylvania, New York, West Virginia, Kentucky, and Arkansas; the latest discoveries were in 1929, when rich deposits were found in Utah. For a long time, the only plant extracting the element for commercial purposes was the one at Fort Worth, Tex., but in 1927 a second was constructed at Amarillo. Because of the unique value of helium for military purposes, the Federal government is developing a conservation program to prevent waste and to conserve available supplies. Exportation of helium is illegal. Because of these conditions, hydrogen is still used in balloons and dirigibles by the other nations, in spite of the obvious dangers attending its use. Helium has also been used successfully in the prevention of caisson disease, contracted by divers



Photos: U & U

**The Making of Helium.** Above, research laboratory of a government helium plant in Texas. Below, some of the mighty compressors which exert a pressure of 3,000 pounds per square inch in recovering helium from natural gas.



Photos: U & U

**Transportation of Helium.** Above, each tank contains 178 cubic feet of gas, under pressure of 1,800 pounds per square inch. Below, a method of transportation in tank cars; each car carries 200,000 cubic feet. This helium goes from Texas to the dirigible hangars at Lakehurst, N. J.

and underground workers, who are subjected to high pressure.

T.B.J.

**Related Subjects.** The reader is referred in these volumes to the following articles:

|                             |               |
|-----------------------------|---------------|
| Aircraft                    | Hydrogen      |
| (Aircraft Lighter than Air) | Radioactivity |
| Chemistry (The Elements)    | Radium        |

**HELL**, a place designated in the Scriptures for the wicked after death, where they are banished from the sight of the Lord. Ancient Greeks and Hebrews, as well as the Teutons, thought that *hades* was a place under the earth whither all people, good or bad, went after death, and in the Revised Version of the New Testament, *hell* is used only to translate *Gehenna*. Christian sects differ greatly in their opinion as to the length and kind of punishment inflicted in hell.

**Derivation and Ancient Forms.** In the early English translations of the Bible, the word, meaning *a hidden or unseen place*, is used for the Hebrew *sheol*, the Greek *hades*, and the Greek *gehenna* (see GEHENNA; HADES).

**HELL DIVER.** See GREBE.

**HELLE.** See DARDANELLES (In Myth and Story); HELLESPONT.

**HELLEBORE**, *hel' e bohr*, the common name of a genus of poisonous plants belonging to the buttercup family. Most of the dozen species

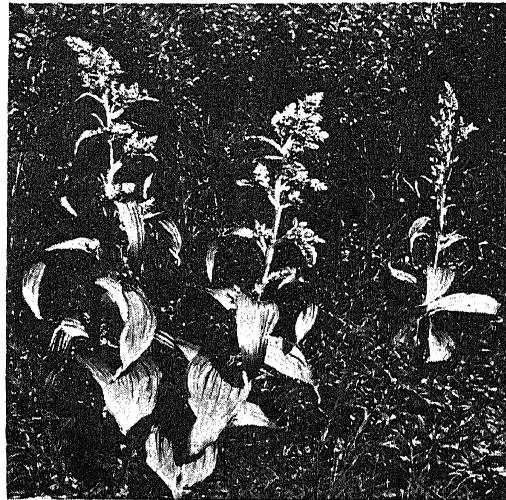


Photo: Visual Education Service

WHITE HELLEBORE

are native to Europe. *Black hellebore*, so called because of its black rootstock, is the source of a powerful poison, which, because of its purgative and emetic qualities, is sometimes used sparingly in medicine. In England it is known as the *Christmas rose*, for its bold white flowers appear in winter. A species known to the ancient Greeks, called *Oriental hellebore*, was supposed by them to be a remedy for insanity.

*White hellebore* is the name of a plant of the lily family. So-called *American hellebore*, a related species, is widely distributed over North America. The roots of white and American hellebore are dried and ground to powder for use as an insecticide. See INSECTICIDES AND FUNGICIDES.

B.M.D.

**Scientific Names.** The hellebores of the buttercup family belong to *Ranunculaceae*. Black hellebore is *Helleborus niger*. Oriental hellebore is *H. orientalis*. The hellebores of the lily family belong to *Liliaceae*. White hellebore is *Veratrum album*; American hellebore is *V. viride*.

**HELLENES**, *hel' eenz*. See GREECE (Ancient GREECE: The People).

**HELLER**, a standard coin of Austria. See MONEY (Foreign Monetary Standards).

**HELLESPONT**, *hel' es pont*, the ancient name of the narrow channel which connects the Sea of Marmora with the Aegean Sea and is now called the *Dardanelles*. It was named after Helle, in Greek mythology daughter of the king of Boeotia and the goddess Nephele. In crossing the channel during her flight from the wrath of Ino, Helle fell from the back of the ram with the Golden Fleece and was drowned. In legend and poetry, the Hellespont is famed as the channel across which Leander swam nightly to visit the priestess Hero, and in which he lost his life when the light in her tower failed to guide him. Lord Byron also swam the Hellespont, though he had not the loverlike reasons that prompted Leander. See DARDANELLES; HERO.

**HELL GATE.** The early Dutch settlers who came to New Amsterdam (New York) discovered in the East River, between Long Island and Manhattan Island, a channel so dangerous that they felt no name but Hell Gate would fit it. From each end a tide poured in, with resulting whirlpools, eddies, and conflicting breakers. To multiply its dangers to navigation, under the surface at high tide, but projecting well above it at low water, were numerous jagged reefs, about which the angry waters swirled. Early navigators avoided the pass when they could, but as settlements grew, commerce grew also, and the use of this channel became more and more necessary.

In 1851 the first attempts were made to make the channel less difficult and dangerous. Surface blasting was first resorted to; later, when the United States government took up the task, the reefs were undermined and destroyed by great charges of dynamite. The last of these operations, in 1885, left a channel 200 feet wide and twenty-six feet deep at low water, which permits the passage of large ocean-going vessels. Hell Gate is thus Hell Gate no longer, but the name remains as a reminder of its past.

A notable bridge spanning the river at this point is one of the great engineering feats of



Photo: U &amp; U

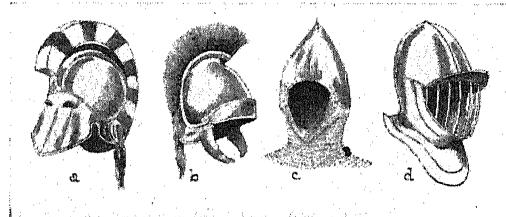
## HELL GATE BRIDGE

Opened for traffic January 1, 1917. The span is 1,016 feet long, and the top of the arch is 300 feet above the water. Over 500,000 cubic yards of concrete were used in its construction, of which 110,000 cubic feet are in the two towers. Its carrying capacity is thirty-eight tons for every linear foot. The bridge cost \$15,000,000.

the twentieth century in concrete construction [see BRIDGE (Arch Bridges)].

**HELMET**, a defensive steel covering for the head, sometimes called a "war hat," which re-

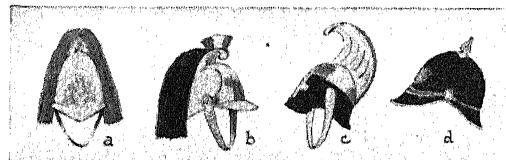
gains. For centuries heretofore, the steel helmet, as part of a soldier's protective covering, has been mainly considered from an



## RELICS OF A BYGONE AGE

(a) Greek; (b) Roman; (c) fourteenth century; (d) seventeenth century.

gained something of its former prestige, if not splendid appearance, in the World War, when a new steel helmet which would stop a bullet



## LATER HELMETS

(a) Great Britain, 1805; (b) France, 1870; (c) Italy, 1870; (d) German officer, 1914.

became an essential piece of armor. By means of this device, thousands of infantrymen were saved from the hail of bullets fired by machine



MEDIEVAL DRAGON-CRESTED HELMET

historical viewpoint. In the Middle Ages, thin metal helmets were made in various styles and were provided with flaps and bars for pro-

tection. With the invention of the rifle ball, however, these ancient devices were rendered useless. See ARMOR.

**HELMHOLTZ**, *helm' hohls*, HERMANN VON (1821-1894), a German scientist, distinguished equally in physiology, mathematics, and in experimental and mathematical physics. He and his pupils gave to mathematical physics its commanding position among the sciences. His physiological works are chiefly concerned with the eye, the ear, and the nervous system. Helmholtz was born at Potsdam and educated at Berlin. In 1849 he became professor of physiology at Königsberg, and later acted in the same capacity at Bonn and at Heidelberg. In 1871 he was appointed professor of physics at Berlin, and through his efforts that city became, during his time, the greatest center in the world for the study of physics through experiment. He was also greatly interested in music, in literature, and philosophy.

**His Books.** Among his many contributions to science are *The Conservation of Force*, *Manual of Optics*, *Popular Lectures on Scientific Subjects*, and *the Sensations of Tone as a Physiological Basis for the History of Music*.

**HELODERM**, *he lo' durm*. See LIZARD.

**HÉLOISE**, *ay lo eez'*. See ABELARD, PIERRE.

**HELOTS**, *hel' ots*, or *he' lots*, the third and lowest class of society in ancient Sparta, composed of slaves who labored on the estates of the higher classes. They were the property of the state, and not of the individual Spartans, among whom they were distributed by lot. The Helots were treated very cruelly, for they had no rights which their masters felt bound to respect. They were watched with distrust, and once, when they grew too numerous for the safety of the state, 2,000 of the leaders were massacred to decrease their apparently dangerous numbers. In time of war, they were obliged to bear arms for the state. In 464 B.C. they revolted against their masters, but after an eight-year war were subdued. Thus they remained slaves until after the Spartans were overthrown at the Battle of Leuctra in 371 B.C., when they were freed by Epaminondas (which see). See, also, SPARTA; GREECE (History: Period of Decline).

**HELSINGFORS**, *hel sing fors'*. See FINLAND (The Cities).

**HELVETII**, *hel ve' she i*, an ancient Celtic people who succeeded the early inhabitants of Helvetia, the region now called Switzerland. The name means *hilly country*. According to Caesar, they occupied the country between the Rhine on the east, the Jura Mountains on the west, and the Rhone River on the south. While Caesar was governor of Gaul, they tried to gain new territory, but were defeated and almost exterminated. Caesar then subjected the country to Roman domination and established sev-

eral colonies. The Helvetii were mercilessly punished a second time for refusing to recognize and salute Vitellius as emperor after the death of Nero, and as a nation they soon after disappeared, being succeeded by the Alemanni. These, in turn, succumbed to the power of the Franks in A.D. 496.

**Related Subjects.** The reader is referred in these volumes to the following articles:

Caesar  
Celts

Franks  
Gaul

**HEMANS**, *hem' anz*, FELICIA DOROTHEA (1793-1835), an English poet who is chiefly known to American readers as the author of a spirited poem entitled *The Landing of the Pilgrims*. Nearly every child in American schools has memorized this tribute to the Pilgrim Fathers, with its noble conclusion:

Ay, call it holy ground,  
The soil where first they trod!  
They have left unstained what there they found—  
Freedom to worship God!

Felicia Dorothea Browne was born in Liverpool, and published her first volume of juvenile poems at the age of fifteen. In 1812 she married an Irish soldier, Captain Hemans.

**Her Writings.** Her English reputation rests upon her shorter lyrical poems, such as *The Treasures of the Deep*, *The Better Land*, *The Voice of Spring*, and *The Homes of England*. Other titles are *The Forest Sanctuary*, *Songs of the Affections*, *Hymns for Childhood*, *National Lyrics and Songs for Music*, and *Scenes and Hymns of Life*.

For her play, *The Vespers of Palermo*, Sir Walter Scott wrote an epilogue, and this marked the beginning of a long friendship between them. Her poetry, though without great originality, is sweet, natural, and pleasing.

**HEMATITE**, *hem' a tile*, the mineral from which most of the world's iron and steel is obtained. It is of a brownish-red, reddish, or black color, but when scratched gives a blood-red streak, hence its name, which means *blood-like*. Hematite occurs in almost all forms, from solid rock to loose earth. Some of the harder forms, which take a high polish and reflect light, like a mirror, are called *specular iron*. An earthy variety constitutes the pigment red ochre. But the great mass of hematite is valuable as the source of iron. In America this ore occurs in immeasurable quantities around the head of Lake Superior in Minnesota, Michigan, and Wisconsin; it is also found in Alabama and at Iron Mountain, Mo. See IRON AND STEEL, for details of wider distribution. A.N.W.

**Chemical Formula.** The formula for hematite is  $\text{Fe}_2\text{O}_3$ , that is, a molecule contains two atoms of iron and three atoms of oxygen.

**HEMICORDATA**, *hem ih kor da' tah*. See ZOOLOGY (Divisions of the Animal World).

**HEMIPTERA**, *he mi p' tur ah*, a large order of insects, including lice, scale insects, and

cicadas, all of the true bugs, and certain degenerate parasitic forms [see INSECT (Classification)]. The name of the order means *half-winged*, and refers to the characteristic thickened base and abruptly thin tips of the front wings. There are, however, several wingless species. All of the Hemiptera have sucking mouth parts. This special organ is a horny, jointed, tapering tube, or beak, with which the insect pierces the plant or animal upon which it feeds, and through which it sucks the sap or blood. With the exception of male scale insects, all Hemiptera undergo an incomplete metamorphosis, the young are much like the adult forms, except in size and in possession of wings.

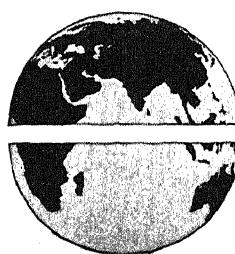
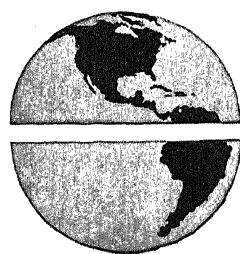
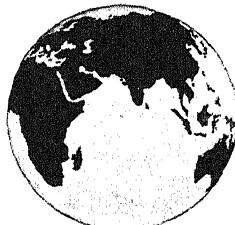
There are three suborders of hemipterous insects. The largest group, *Heteroptera*, includes the true bugs (see BUG); the second largest division is *Homoptera*, made up of aphides (plant lice), scale insects, cicadas, and some less important forms. The classes enumerated are notable for the damage they do to agriculture. Finally, there is the group *Parasita*, comprising the lice that suck the blood of mammals.

W.J.S.

**Related Subjects.** The following important members of the order Hemiptera are given separate treatment in these volumes:

|            |                |
|------------|----------------|
| Aphides    | Louse          |
| Bedbug     | Mealy Bug      |
| Chinch Bug | Phylloxera     |
| Cicada     | San José Scale |
| Cochineal  | Scale Insect   |

**HEMISPHERE**, *hem'* is *feer*, literally *half a sphere*, is a term particularly applied to one



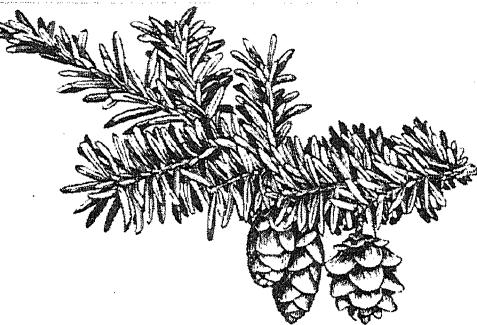
HEMISPHERES

Above, western and eastern, the New World and the Old World, respectively; below, northern and southern.

of the two sets of halves into which the globe is divided. The eastern hemisphere, or Old

World, embraces Europe, Asia, Africa, and Australia; North and South America are included in the western hemisphere, or New World. The boundary is not fixed by geographical or political considerations, but runs rather indefinitely, from Pole to Pole, through the North and South Atlantic and the Pacific oceans. The division of the earth's surface into northern and southern hemispheres is natural, the equator, midway between the Poles, forming the dividing line.

**HEMLOCK**, OR **HEMLOCK SPRUCE**, a beautiful evergreen tree of the pine family,



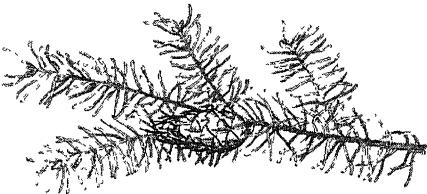
HEMLOCKS

Above, mature foliage and ripe cones of Eastern hemlock. Below, mature tree of North Carolina.

which Longfellow immortalized in the opening lines of the poem *Evangeline*:

This is the forest primeval. The murmuring pines  
and the hemlocks,  
Bearded with moss, and in garments green, indis-  
tinct in the twilight,  
Stand like Druids of old. . . .

The hemlock ranges from Nova Scotia to Ala-  
bama and Georgia, and as far west as Wiscon-  
sin and Minnesota. It assumes a pyramidal



WESTERN HEMLOCK  
Branch and cone.

shape, and usually grows sixty to seventy feet tall, attaining a height of 100 feet in the North Carolina and Tennessee mountains. It is distinguished from other pines by its short, blunt, flat leaves, or needles, which are dark green above and silvery below, and by its twisted leaf stems, which seem to grow on the branches in ranks of two. The small cones, of a reddish-brown color, hang from the branches on short stems, and the branches themselves, heavily clothed with pendulous foliage, droop in a most graceful manner.

There is a second eastern species occurring locally in the states of Virginia, North Carolina, and Georgia, and two species are found on the western coast between Alaska and California. The larger of these grows to great size in Washington, Oregon, and northward.

Hemlock bark is extensively used in the tanning industry, and oil is distilled from the branches and leaves. The hemlocks are not valuable timber trees, because their wood is soft and subject to warping, but they promise to be an important factor in the wood-pulp industry. Wood from the large western species is suitable for flooring and for other products not exposed to water.

G.M.S.

**Scientific Names.** The most important eastern and western species are, respectively, *Tsuga canadensis* and *T. heterophylla*. The secondary eastern species is *T. caroliniana*, and the smaller western, *T. mertensiana*.

**HEMLOCK**, commonly called POISON HEMLOCK, a poisonous plant with leaves so like those of parsley that it is often mistaken for the latter plant. It grows to a height ranging from two to six feet, with hollow stems, many branches, and numerous clusters of small white flowers. The plant has a disagreeable, nauseous odor, which becomes very strong

when the leaves or stems are bruised. This affords a sure and quick means of distinguishing between hemlock and parsley. The hemlock bears an egg-shaped fruit about one-eighth of an inch in length, which ripens in August or September. The leaves and fruit are used for medicinal purposes, chiefly on account of the soothing action of the drugs they contain. The poison hemlock is a native of Great Britain, the continent of Europe, and some parts of Asia, and has been naturalized in North America and Chile. It grows chiefly on low-lying, marshy ground. Socrates, the Greek philosopher, and Phocion, the Athenian general, died after drinking a brew of poison hemlock. This plant should not be confused with the hemlock spruce, an evergreen tree.

B.M.D.

**Scientific Name.** Poison hemlock belongs to the family *Umbelliferae*. Its botanical name is *Conium maculatum*.

**HEMMING STITCH.** See SEWING, sub-head.

**HEMOGLOBIN**, *he mo glo' bin*. See ABSORPTION (In Physiology); BLOOD (Composition of the Blood).

**HÉMON**, LOUIS. See CANADIAN LITERATURE (French Canada: Fiction).

**HEMOPHILIA**, *he mo fil' ih ah*. See BLOOD (Composition of the Blood); BLEEDING.

**HEMORRHAGE**, *hem' o raje*. See FIRST AID TO THE INJURED; BLEEDING.

**HEMORRHAGE**, CEREBRAL. See APoplexy.

**HEMORRHOIDS**, *hem' o roidz*. See PILES.

**HEMP**, an annual plant belonging to the nettle family, cultivated chiefly for its fiber, but also for its seeds, which, too, have economic value. As far as known from actual records, hemp is the oldest of the fiber-yielding plants, even antedating flax (which see). Twenty-eight centuries before the Christian Era, the people of China were making cloth out of hemp fiber. There is historic evidence of the use of the fiber in Europe as early as 270 B.C., and the first English colonists in what is now the United States used home-woven hencloth.

**Description and Cultivation.** Hemp cultivated for fiber is produced from seeds sown broadcast. It develops a slender stem that grows four to twelve feet in height without branching. Hemp for seed is produced in hills or drills, and develops a thicker stalk with many branches. This stalk attains a height of ten to twenty feet. The flowers that bear the pollen (staminate) and those that produce the seed (pistillate) grow on separate plants. The former are yellowish-green in color and grow in large clusters; the latter, which come to maturity later than the staminate flowers, are small and insignificant.

Hemp is best adapted to regions with a moist, temperate climate, and requires a well-drained,

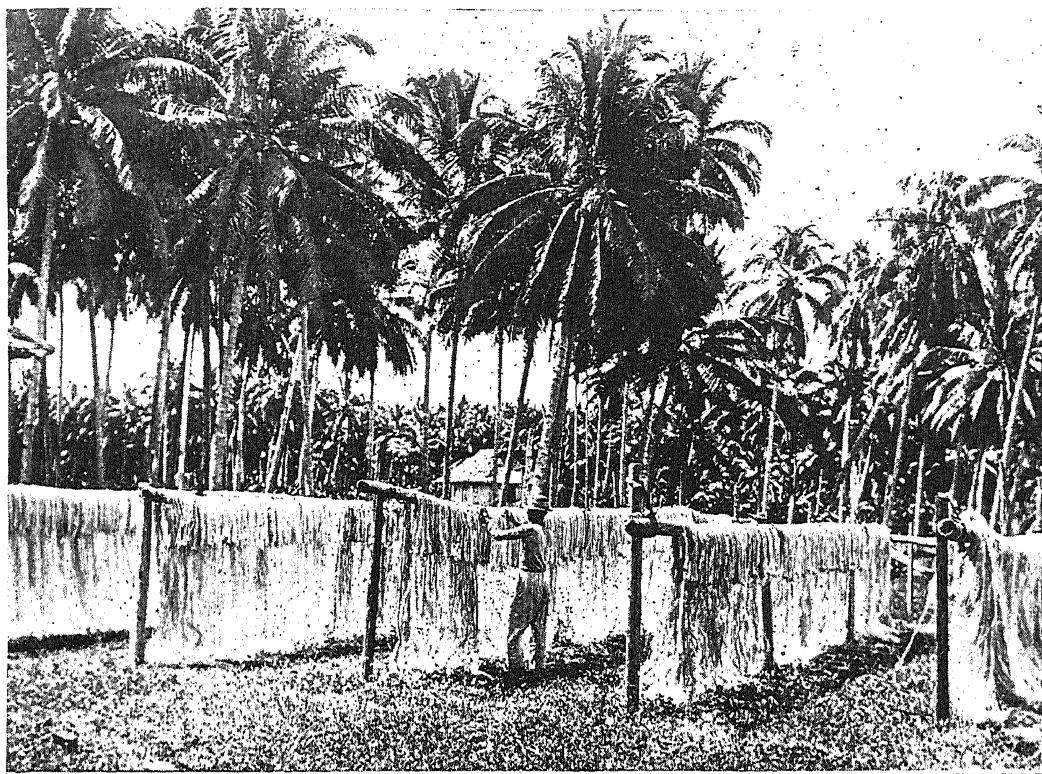


Photo: U &amp; U

DRYING HEMP IN THE PHILIPPINE ISLANDS

fertile soil, free from acidity. Its successful cultivation in the Kentucky blue-grass region is due to the rich, loamy soil in that part of the state. In California it thrives best in the fertile soils of the low-lying lands along the rivers; good crops under irrigation are also secured from the alluvial soils of the lower Sacramento Valley. Hemp for fiber is harvested when the staminate flowers have fully blossomed. In the United States, the plants are cut with self-rake reapers, or with harvesting machines that mow the stalks and spread them in uniform layers in one operation. In some European countries, the work is all done by hand.

**Preparing the Fiber for the Market.** Hemp fiber consists of many series of long cells in the inner bark of the stem, firmly knitted together. When cleared from the tissues that surround them, these form tough strands nearly as long as the entire stem. In order to free the fibers from the woody interior of the plant, the vegetable gums which surround them are dissolved by a kind of putrefaction which takes place when the stalks are soaked in soft water or exposed to the action of the weather, by hanging on poles (see illustration). This process is known as *retting*, or *rotting*. In Italy, where water-retting is the rule, the fibers are

fine, lustrous, soft, and creamy white, the Italian product being the best in the world. Water-retting is more expensive than dew-retting, or exposure to the weather, and the latter process has been found to yield a greater profit to American hemp-growers. Dew-retted hemp yields a fiber of grayish color.

When the retting process is completed, the stalks are crushed and beaten with a heavy wooden hand brake, by which the fiber is freed from the stem and roughly cleaned. In Wisconsin and California, machines are used which break the stalks and clean the fiber much more rapidly than is possible by hand labor, but the latter method is still retained in Ken-



HEMP  
Head of plant.

tucky. After the breaking process, the rough fiber is tied into bales for marketing.

**Uses of Hemp.** Hemp fiber is characterized by great strength, a quality which adapts it admirably to the manufacture of ropes and cordage. Twines, carpet thread and yarns, sailcloth, and coarse grades of woven goods, such as sheeting and toweling, are also made from it. Refuse fiber, called *oakum* (which see), is often used to fill the seams of vessels. Some hemp is utilized in paper-making. Hemp seeds contain from thirty to thirty-five per cent of oil, a substance used in cooking and as an ingredient of varnishes. Hemp seeds are also in common use as a food for birds.

**Production.** The hemp-producing countries are Italy, Russia, France, Belgium, the Philippine Islands, Hungary, Yugoslavia, Japan, China, Manchuria, Chile, and the United States. Wisconsin, Ohio, and Kentucky are the leading hemp states; the plant is also raised in North and South Dakota, Michigan, Indiana, California, Illinois, and Minnesota. Kentucky has been raising hemp since 1775, but lost first place in acreage during the World War. B.M.D.

**Classification.** Hemp belongs to the family *Urticaceae*. Its botanical name is *Cannabis sativa*. There are several other plants, of different botanical classification, that are called hemp. *Manila hemp*, more correctly called *abaca*, belongs to the banana family and is cultivated in the Philippines. Its fiber is used for cloth, hats, rope, and twine. So-called *bowstring hemp*, from species of *Sansevieria*, belonging to the lily family, is used in tropical countries for cordage, strings for bows, and mats. See, also, *SISAL*.

#### HEMP, INDIAN. See HASHISH.

**HEMPEL, FRIEDA** (1885- ), an operatic soprano. She was born in Leipzig, Germany, and educated at the Sterns Conservatory, Berlin. In 1905 she made her début at the Berlin Royal Opera House in *The Merry Wives of Windsor*. For several years, Miss Hempel toured the continent of Europe, and was the principal guest soprano at the leading opera houses in London, Paris, Warsaw, Stockholm, Brussels, and other important musical centers. Many decorations and awards were bestowed upon her for the highly artistic quality of her singing.

In 1912 she joined the Metropolitan Opera Company, New York, and continued there as a leading coloratura soprano. She possesses a voice of remarkably pleasing quality, and her musical technique is almost without fault.

**Her Rôles.** Among her principal rôles are the following: Violetta in *Traviata*; Gilda in *Rigoletto*; Susanna in *Figaro*; Rosina in *Barber of Seville*; Eva in *Die Meistersinger*; Marie in *Daughter of the Regiment*; Marschallin in *Rosenkavalier*; Mimi in *La Bohème*; Marguerite in *Faust*; and about seventy other leading rôles.

**HEN.** See POULTRY.

**HENDERSON, ARTHUR** (1863- ), a British politician and a leader in the Labour party. He was born in Glasgow, but began his political career in Newcastle, where he became prominent in the trade-union movement. After some success in local politics, he was elected to Parliament in 1903. Five years later, he was elected chairman of the Labour party, and served until 1910. In 1914 he was elected a second time for a term of three years. He served as President of the Board of Education and Paymaster-General in Asquith's Cabinet, in 1915, and the following year, was offered a position in the War Cabinet of four. After a visit to Russia, Henderson advocated measures of which the War Cabinet disapproved, and he resigned in August, 1917. He retained his seat in Parliament, however, and in 1924 became Secretary of State for Home Affairs in the MacDonald Ministry. When, in 1929, a new election brought about a return of the Labour Ministry, headed again by MacDonald, Henderson became Secretary of State for Foreign Affairs. See MACDONALD, JAMES R.

**HENDERSON, KY.** See KENTUCKY (back of map).

**HENDRICKS, hen' driks**, THOMAS ANDREWS (1819-1885), one of the most famous of the governors of Indiana and a former Vice-President of the United States. He was born on a farm near Zanesville, O., was educated in the public schools of Indiana, studied law in his uncle's office, and was admitted to the bar in 1843. He was elected to the legislature in 1848, to the national House of Representatives in 1851, and in 1863 to the United States Senate; was a candidate for the Democratic nomination for President in 1868, and in 1872 was elected governor of Indiana. He was nominated for the Vice-Presidency by the Democratic party in 1876, on the ticket with Tilden; was again a candidate in 1884, with Cleveland as the candidate for President, and was elected. Hendricks was the fifth Vice-President who died during his term of office.

**HENGIST AND HORSA**, semi-legendary Jutes who landed with their bands in Kent, England, in 449. Hengist is said to have ruled Kent until his death in 488, and Horsa to have

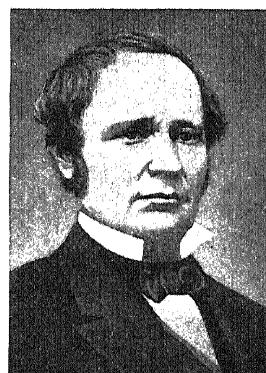


Photo: U & U

THOMAS A. HENDRICKS  
Vice-President of the  
United States during  
Grover Cleveland's first  
term as President (1885-  
1889).

been slain about 455, at the Battle of Aylesford. They are mentioned in the *Anglo-Saxon Chronicle*. They came to Britain to help the British king Vortigern against the Picts, but they turned against him at the time Horsa was defeated. Hengist is said to have later conquered all of Kent. See ENGLAND (History: The Romans Withdraw).

**HEN HAWK.** See FALCON; GOSHAWK; HAWK.

**HENLEY, WILLIAM ERNEST** (1849-1903), an English poet, editor, and critic, who was a leader in the revolt against the outworn traditions of the Victorian Age. Afflicted from childhood with a tuberculous disease, beset by misfortunes throughout his life, Henley displayed a magnificent courage that is well illustrated by the famous lines from his often-quoted *Invictus*:

It matters not how strait the gate,  
How charged with punishments the scroll,  
I am the master of my fate;  
I am the captain of my soul.

Henley was born at Gloucester, and was educated there at the Crypt Grammar School. During his early manhood, he lay on his back in an Edinburgh hospital for twenty months. While there, he wrote, for the *Cornhill Magazine*, a series of poems entitled *Hospital Rhymes*. Through the editor of the magazine—Leslie Stephen—Henley came to know Robert Louis Stevenson, and, for many years, the two were the best of friends. They collaborated on five plays, and Stevenson used his friend as a model for Long John Silver in *Treasure Island*. A quarrel that was never healed marred the relationship at a later period; the great novelist died nine years before Henley, and the two had not then become reconciled.

From 1877 until his death, Henley edited literary periodicals of high excellence but uncertain financial support; he made an art of journalism, and his pungent criticisms had a profound effect upon his contemporaries. Yet his poetry was his greatest achievement, and by it he is remembered to-day. Original and forceful, but sometimes permeated with sheer lyric beauty, his verse is wholly typical of this rugged and fearless writer.

**His Works.** Henley's best-known critical writings include *Views and Reviews* (two series), *The Centenary Burns*, and his editorial work on *A Book of English Prose and Tudor Translations*. His volumes of poetry are represented by *The Song of the Sword*, *For England's Sake*, *Hawthorn and Lavender*, and *A Song of Speed*.

**HENNA,** a small shrub, also known as EGYPTIAN PRIVET and JAMAICA MIGNONETTE, which grows in Arabia, Persia, the East Indies, and Northern Africa. It is cultivated for its flowers, the fragrance of which is prized by

Egyptian ladies, and for the leaves, from which coloring matter is derived. Women of the East long have used it to color their nails, the tips of their fingers, and parts of their feet, and men have employed it for dyeing their beards, the manes and hoofs of horses, and for coloring skins. As a dye, henna is a reddish color approaching the orange and yellow, varying according to the article to which it is applied. It is commonly used in America as a dye for the hair.

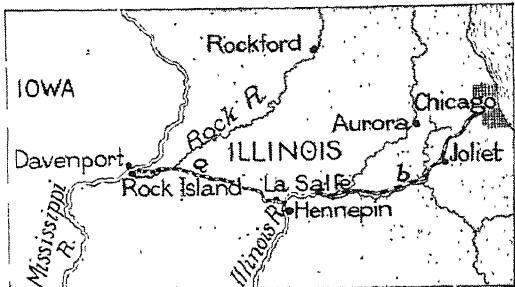
**Scientific Name.** Henna belongs to the loosestrife family, *Lythraceae*. Its scientific name is *Lawsonia alba*.

**HENNEPIN, hen' e pin**, LOUIS (about 1642-1706), a Belgian missionary, and one of those explorers about whose names clings much of the romance of early days of adventure and discovery in the Mississippi Valley. He had preached and won many converts in France before he set out with La Salle, in 1675, to carry the gospel to the American Indians. As soon as he had made a slight acquaintance with their language, he began preaching to the Indians at Fort Frontenac, but the call of further adventure was strong, and in 1678 he started with La Salle on an exploring expedition. In a boat which Hennepin had built, the party made its way through lakes Erie, Huron, and Michigan, until they came to the Saint Joseph River. Up this they paddled in canoes, which also bore them down the Kankakee to the Illinois River.

At Fort Crèvecoeur, which they built near the present city of Peoria, Hennepin parted from La Salle, to proceed down the Illinois to the great "Father of Waters." Captured by the Indians and carried far up the Mississippi, he and his followers were the first white men to look upon Saint Anthony's Falls and the Minnesota region thereabout. This experience discouraged Hennepin, who returned shortly afterward to France, and though his superiors in the Church ordered him to return to America, he refused. After La Salle's death, Hennepin published a *New Discovery of a Very Great Region Situated in America*, in which he assumed the credit for many of La Salle's discoveries. Some of his assumptions were proved false, but this story was enthusiastically read and widely translated. See LA SALLE, RENÉ ROBERT.

**HENNEPIN CANAL**, also called ILLINOIS AND MISSISSIPPI CANAL, the only small-boat canal constructed in the United States since 1850. It extends from the Illinois River near Hennepin to the Mississippi, three miles below Rock Island. After fifteen years' work, it was completed in 1907 at a cost of \$7,500,000 and is now used principally for the transportation of coal (and a little grain) from the Illinois fields; even for this purpose its usefulness is

declining. The canal is seventy-five miles long, fifty-two feet wide at the bottom, and seven feet deep, and has thirty-two locks. Another canal nearly thirty miles in length, of the same width and depth, enters the Hennepin near Sheffield and serves as a feeder, the water being



ILLINOIS CANALS

(a) Hennepin; (b) Illinois and Michigan.

forced into the main canal by a dam a quarter of a mile long, at Sterling. In connection with the Illinois and Michigan Canal (which see), this affords a short route for light boats going from Lake Michigan to the Upper Mississippi. See CANAL.

**HENRIETTA**, a dress fabric of light weight, named after Henrietta Maria, wife of Charles I of England. It is finer and more lustrous than cashmere, which it resembles. Henrietta has a twill weave.

**HENRIETTA MARIA**, consort of Charles I, and the queen for whom Maryland was named. See CHARLES (I, England); BALTIMORE, SIR GEORGE CALVERT; MARYLAND.

**HENRY**, a name famous in English history, borne by eight sovereigns who have worn the crown of England.

**Henry I** (1068-1135), the third of the Norman line of kings, was the youngest son of William the Conqueror. Because of his studious habits he has received the surname *Beaumont*, which means *good scholar*. He caused himself to be proclaimed king in 1100, on the death of his brother, William Rufus, who was killed while hunting in the New Forest. Henry's right to the throne was contested by his elder brother, Robert, Duke of Normandy, and in the wars which followed, Henry not only established his claim to the royal title, but wrested from Robert all of his possessions in Normandy.

To win the favor of his Saxon subjects, he married Matilda, daughter of Malcolm III of Scotland; their daughter, the Princess Matilda, was named by her father as his successor to the throne. During Henry's reign, great progress was made in the unifying of his Saxon and Norman subjects, and the wars he waged against the Normans in France greatly stimulated the feeling of English nationality. Like his illustrious father, Henry consistently op-

posed the powerful feudal lords, and made himself the champion of the common people.

**Henry II** (1133-1189), the son of Matilda, Henry I's daughter, and of Geoffrey Plantagenet, Count of Anjou, was the first of fourteen English rulers of the Plantagenet line. On the death of Henry I in 1135, the throne was seized by Stephen of Blois, a grandson of William the Conqueror, and after several years of warfare, an agreement was made whereby Stephen was to retain the crown and Henry was to be his successor. The latter's coronation took place in 1154, and his long reign of thirty-five years was memorable.

Henry continued the policy of his predecessors in checking the power of the great nobles, and he also attempted to make the Church submit to the civil power. As a result of his struggle with the clergy, Thomas à Becket, the archbishop of Canterbury, was murdered. During his reign, circuit courts were established, the financial system was reorganized, and roads were built. In this period, also, the English gained their first supremacy over the Scots, while the foundation for the present kingdom was laid by the king's conquest of Ireland. Henry's last years were embittered by the disloyalty and rebellion of his sons, among whom were Richard the Lion-heart and John, the next two sovereigns of England.

**Henry III** (1207-1272), eldest son of King John, succeeded his father in 1216, but his personal rule did not begin until 1227, when he was declared of age. He proved himself a faithless and tyrannical king, and in 1258 the great nobles, led by Earl Simon de Montfort, rose in revolt, forcing him to sign an agreement known as the Provision of Oxford, whereby the governing power was to be placed for the time being in the hands of a committee of the barons. Henry later repudiated this agreement, and in the civil war which followed, he was defeated at the Battle of Lewes (1264) and taken prisoner. In the king's name, Earl Simon then summoned a Parliament, in which the commons, as well as the clergy and nobility, were represented, marking the beginning of the modern system of Parliamentary government (1265). Throughout the remainder of Henry's reign, his son, Prince Edward, had control of affairs.

**Henry IV** (1367-1413) was the eldest son of John of Gaunt, and the first of the Lancastrian line of kings. He ascended the throne in 1399, on the abdication of the weak Richard II, and as he owed his right to rule to Parliament, he is sometimes known as the first constitutional monarch of England. His firmness and vigor were revealed early in his reign, in his suppression of the uprisings of rebellious nobles and of the Scots and the Welsh. During this period occurred the first persecution of the Lollards.

Henry was the friend and patron of England's first great poet, Geoffrey Chaucer.

Henry V (1387-1422), son and successor of Henry IV, came to the throne in 1413. He continued his father's persecution of the Lollards, and in 1417 put to death their celebrated leader, Sir John Oldcastle. The Hundred Years' War with France, begun in the reign of Edward III, was renewed by Henry in 1415. After capturing the town of Harfleur, he met a great French army of armor-clad knights on the field of Agincourt, and with a force of 10,000, most of whom were armed with bows and arrows, overwhelmingly defeated them. Five years later, he concluded with the French king, Charles VI, the Peace of Troyes, according to which the crown of France was to go to the English king on the death of Charles. War broke out again in 1422, and early in the campaign, Henry was taken ill and died.

Henry VI (1421-1471) was proclaimed king of England in 1422, on the death of his father, Henry V, though at this time he was less than a year old. A few weeks later, Charles VI of France died, and the child, in accordance with the terms of the Treaty of Troyes, was proclaimed king of France also. Henry's uncle, the Duke of Bedford, ruled for him in France and succeeded in holding that country until 1429, when, through the heroism of Joan of Arc, the English were defeated at Orleans. Gradually the French won back their possessions, until, in 1451, Calais alone was left to England. That was not lost to the English until a century later.

Henry was pious and gentle, but hopelessly incompetent, and at intervals suffered from attacks of insanity. The great nobles took advantage of his weakness to oppress the common people, and the popular discontent found expression in 1450 in the uprising known as Jack Cade's Rebellion. In this reign began the struggle between the rival houses of York and Lancaster, the first battle of which, fought at Saint Albans, in 1455, was a defeat for the king's forces. In 1461, Edward IV, head of the House of York, was crowned king. Henry was reinstated for a brief period in 1470, but the following year he was imprisoned in the Tower of London, where he was murdered.

Henry VII (1456-1509), first of the royal Tudor line, was proclaimed king in 1485, after the defeat of Richard III at Bosworth Field,



HENRY VI

the last battle of the Wars of the Roses. He laid claim to the kingly title as a descendant, on his mother's side, of John of Gaunt, founder of the House of Lancaster. His father was Edmund Tudor, Earl of Richmond. By his marriage to Elizabeth, a princess of the House of York, he at last united the two rival houses. Several insurrections troubled his reign, but these were easily suppressed, and he won the support of the common people by refusing to be drawn into foreign wars.

During his reign, the royal power was greatly strengthened by despotic measures, but these were directed chiefly against the nobility, from whom he exacted heavy taxes. To strengthen an alliance made with Spain, he arranged for the marriage of his son Arthur to Catharine

of Aragon, daughter of Ferdinand and Isabella of Spain, and, after Arthur's death, secured the betrothal of the young widow to his son Henry (afterward Henry VIII). The friendship of the



HENRY VII

Scots was won by the union of his daughter Margaret with James IV of Scotland. Henry's reign was made glorious by the discovery of the continent of North America by John Cabot, in 1497.

**Henry VIII** (1491-1547), the king who severed the ties that bound the Church of England to the Church of Rome, succeeded his



HENRY VIII

Photo: Brown Bros.

father, Henry VII, in 1509, and was crowned two weeks after his marriage to Catharine of Aragon. During the first part of his reign, he gave his attention chiefly to foreign affairs. After the election of Charles V as Holy Roman Emperor, Henry's aid was sought both by the emperor and by his rival for the imperial dignity, Francis I of France, and a friendly meeting took place in 1520 between the English and French kings on the famous Field of the Cloth of Gold. Henry gave his support to Charles, but withdrew from the struggle in 1525.

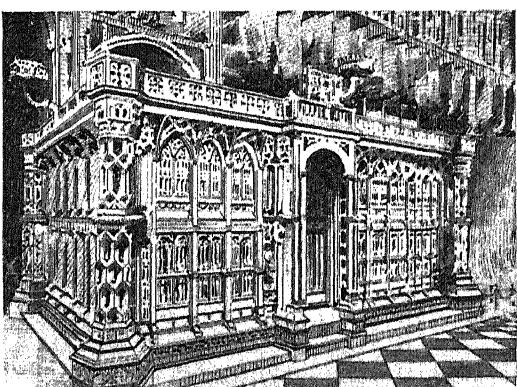
In the meantime, he had come to a momentous decision in regard to his domestic affairs, and one that was destined to have permanent influence in English history. Having grown tired of his wife, who had failed to bear him a male heir, and infatuated by the charm and beauty of Anne Boleyn, one of the queen's maids of honor, he determined to secure a divorce. He pretended to believe that Heaven had failed to send him a son because he had married his brother's widow, and in 1527 he asked Pope Clement VII to declare the marriage illegal and to grant him a divorce. Not being able to obtain the Papal consent to this scheme, he acted on the suggestion of one of his trusted advisers, Thomas Cromwell, and proceeded to get a decree from his own courts. In 1533 he secretly married

Anne Boleyn, and in the same year, Thomas Cranmer, who had been made archbishop of Canterbury, formed a court and tried the case, as a result of which the first marriage was declared null and void, and the second one lawful.

A submissive Parliament completed the breach with Rome by passing two acts. One, enacted in 1534, set aside the authority of the Pope in England; the other, the celebrated Act of Supremacy (1535), declared Henry the supreme head of the Church of England. The king used his authority to suppress the monasteries of the kingdom, and in 1539 all monastic property was given to the Crown.

Anne Boleyn did not long retain the affection of her royal master, and in 1536 she was beheaded on the charge of unfaithfulness. Her daughter, the Princess Elizabeth, became in time Queen Elizabeth, or "Good Queen Bess," one of the most illustrious rulers of history. Jane Seymour, Henry's third wife, was the mother of a prince who later ruled as Edward VI. On the death of Jane, the king married a German princess, Anne of Cleves, the arrangements for the union being made by Cromwell. Henry's dislike for his wife resulted in another divorce and in the disgrace and death of the minister who had brought about the marriage. The fifth wife, Catharine Howard, was soon sent to the block, because it was proved that she had been guilty of misconduct before marriage. In 1543 Henry married his sixth and last wife, Catharine Parr, who succeeded in outliving her husband.

The outstanding feature of Henry's reign was the separation of the Church of England from the Church of Rome, an event which sometimes overshadows his constructive work as a creator of the English navy. While other monarchs were creating standing armies, he



TOMB OF HENRY VIII

was bringing the sailing warship to perfection, laying the foundation for England's mastery of the seas. The most important literary event of

his reign was the publication of Sir Thomas More's *Utopia* (which see), a romance of an imaginary ideal kingdom.

B.M.W.

**Related Subjects.** The following articles in these volumes will throw light on the periods of English history covered by the reigns of these eight kings:

|                               |                                   |
|-------------------------------|-----------------------------------|
| Agincourt, Battle of          | John                              |
| Becket, Thomas à              | John of Gaunt                     |
| Boleyn, Anne                  | Lancaster, House of               |
| Cabot, John and<br>Sebastian  | Montfort, Simon de<br>Plantagenet |
| Catharine of Aragon           | Reformation, The                  |
| Charles (France)              | Richard (England)                 |
| Cromwell, Thomas              | Roses, Wars of the                |
| England (History)             | Stephen                           |
| Field of the Cloth of<br>Gold | Tudor                             |
| Hundred Years' War            | William (I, England)              |
| Joan of Arc                   | York, House of                    |

**HENRY**, the name of four French kings. HENRY I (1008-1060) was the grandson of Hugh Capet, founder of the Capetian dynasty. His reign marked the height of the feudal system in France.

**Henry II** (1519-1559), son and successor of Francis I, ascended the throne in 1547. During his reign, the



HENRY II

French won from the English the important port of Calais, their last possession in France, but in a war with Philip II of Spain, the French king was less suc-

cessful, and after suffering severe defeats, was obliged to sign an unfavorable treaty at Cateau-Cambrésis (1559). His persecution of the Huguenots sowed the seeds of the terrible religious wars that desolated France during the reigns of his sons, Charles IX and Henry III. Henry's wife was the famous Catharine de' Medici.

**Henry III** (1551-1589), third son of Henry II, succeeded his brother Charles in 1574. During his en-



HENRY III

tire reign, the country was harassed by the struggles between the Protestant and Catholic parties. By granting certain concessions to the Huguenots, Henry so alarmed the opposite faction that, under the leadership of the Duke of Guise, they formed a Catholic League. Through the influence of the League, the privileges of the Huguenots were repealed, bringing on a war in which the Protestants, led by King Henry of Navarre, were successful.

Then followed the assassination of two Catholic leaders, the Duke of Guise and the Cardinal of Lorraine, which aroused the bitter indignation of all Catholics of France and prompted Henry to place himself under the protection of Navarre. The two kings then came to an understanding and planned the capture of Paris, but as they were advancing toward the city, at the head of a great army, Henry of France was assassinated. He was the last ruler of the House of Valois.

**Henry IV** (1553-1610), successor of Henry III, best known as **Henry of Navarre**, one of the most imposing figures in French history for two centuries and one of the greatest of the Bourbon line of kings. He was the son of Anthony of Bourbon, Duke of Vendôme, and of Jeanne d'Albret, queen of Navarre. His mother reared him in the Protestant faith, and in his early manhood he joined the Huguenot army in France. In 1572 he married Margaret of Valois,



HENRY IV

Better known as Henry of Navarre.

sister of Charles IX, and after the Massacre of Saint Bartholomew's Day, which took place during the marriage festivities, he was forced to accept the Catholic faith. Escaping from Paris, in 1576, he retracted his statement of conversion and placed himself at the head of the Huguenots, winning a decisive victory over the Catholic League at Coutras, in 1587.

Two years later, King Henry III was assassinated. Before he died, he named Henry of Navarre as his successor, but the latter had to assert his claim to the throne by force of arms. At Ivry, on March 14, 1590, he won the splendid victory which Macaulay has celebrated in his *Battle of Ivry*. Its opening lines are famous:

Now glory to the Lord of Hosts, from whom all  
glories are!  
And glory to our Sovereign Liege, King Henry of  
Navarre.  
Now let there be the merry sound of music and  
the dance,  
Through thy cornfields' green and sunny vines,  
oh! pleasant land of France.

Even this victory did not smooth his path; so, in order to bring peace to his distracted country, he declared himself a Catholic and was crowned king in 1594. In 1598, when tranquillity had been restored throughout the kingdom, he issued the famous Edict of Nantes, granting religious liberty to his Protestant subjects. Henry then turned his attention to the development of his country's resources, and France enjoyed a period of prosperity it had not known for

many years. In 1610, while he was preparing to make war on the House of Austria, he was struck down by the dagger of an assassin.

**Related Subjects.** The following articles in these volumes contain much information as to the history of France during the periods of these kings:

|                      |                     |
|----------------------|---------------------|
| Bourbon              | Nantes, Edict of    |
| Capetian Dynasty     | Navarre             |
| Catharine de' Medici | Saint Bartholomew's |
| France (History)     | Day                 |
| Guise                | Valois, House of    |
| Huguenots            |                     |

**HENRY**, the name borne by seven rulers who wore the crown of the Holy Roman Empire. Of these, Henry III, Henry IV, and Henry VI were the most important.

**Henry III** (1017-1056) succeeded to the throne of Germany in 1039 on the death of his father, Conrad II, and was crowned emperor in 1046. Under his able rule, the power of the German nation was greatly increased, and he is also renowned in history for the part he took in strengthening the powers of the Pope and in encouraging reforms in the Church. In 1046, when three rivals were attempting to gain the Papal throne, he made an expedition to Italy, settled the difficulty by appointing a new Pope, Clement II, and throughout the rest of his reign made the nominations to the Papal chair.

**Henry IV** (1050-1106), son and successor of Henry III, became king of Germany at the age of six. During his mother's regency, the nobles rose in revolt, and when Henry, in 1069, took control of affairs, he found the kingdom in a state of turmoil. After several years of warfare, by which he attempted to establish his authority throughout his dominions, he came into conflict with Pope Gregory VII, who, in 1075, issued a decree forbidding civil rulers to make appointments to Church offices. Henry's answer to this decree was his summoning of a council at Worms in 1076, which deposed the Pope.

Gregory in turn excommunicated the king, releasing his subjects from their allegiance to him, and after a futile struggle, Henry was forced to yield. Gregory had retired to a stronghold at Canossa, in the Apennines, and the humbled ruler was obliged to stand barefooted in the snow in the castle courtyard for three days, before he was permitted to kneel at the feet of the Pope and receive forgiveness.

On his return to Germany, however, he renewed the struggle, and for years his country was torn by civil war. In 1084 he succeeded in capturing Rome, placing on the Papal throne an antipope of his own selection, who in the same year crowned him Holy Roman Emperor. Soon after, Pope Gregory died in exile, and the contest was taken up by his successors, one of whom renewed the sentence of excommunication against the emperor. Finally, in 1105, after one of his own sons had been persuaded to rebel against him, Henry was forced to abdicate. A few months later, in the midst of preparations for war, he died.

**Henry VI** (1165-1197) was the son of Frederick, surnamed BARBAROSSA. He succeeded to the throne in 1190, and the following year was crowned emperor at Rome. Through his wife he laid claim to the throne of Sicily, and a part of his reign was given up to the conquest of the Sicilian kingdom. While Richard the Lion-heart, king of England, was passing through Henry's dominions on his way home from the Third Crusade, the emperor caused his arrest and imprison-

ment, and the release of the royal captive was secured only on the payment of a ransom equivalent to nearly \$50,000—a large sum at that time. Henry was one of the strongest of the early German emperors, and when he died he was attempting to secure for his own family the hereditary rights to the crown.

**Related Subjects.** Further information as to the periods of history which fell within the reigns of these monarchs will be found in the following articles:

|                                    |                      |
|------------------------------------|----------------------|
| Crusades                           | Gregory (VII, Popes) |
| Frederick I, Barbarossa            | Holy Roman Empire    |
| Germany (Conflict with the Papacy) | Richard (I, England) |

**HENRY, ALEXANDER.** See CANADIAN LITERATURE (English Canada).

**HENRY, JOSEPH** (1799-1878), an authority in physics, whose brilliant experiments in electricity have coupled his name with Franklin's and Edison's as one of the three most original investigators that America has thus far produced in that branch of science. He was born at Albany, N. Y., and received his education in the Albany Academy. He began to experiment with electricity at an early age, and his first important achievement was the development of the electromagnet, previously discovered by William Sturgeon of England (see ELECTROMAGNET).



Photo: Brown Bros.

JOSEPH HENRY

MAGNET). A large magnet which Henry built, capable of sustaining 3,600 pounds and occupying a single cubic foot of space, is now in the possession of Princeton University. In 1831 he invented the first electromagnetic telegraph, transmitting signals over a wire more than a mile in length, causing a bell to ring at the farther end of the wire. "This," said President Garfield, "was the last step in the series of great discoveries which preceded the invention of the telegraph."

In November, 1832, Henry was called to occupy the chair of natural philosophy at Princeton, where he remained for several years. In 1846 he became the first secretary and director of the Smithsonian Institution. Upon the organization of the government lighthouse board, in 1852, he became a member, and from 1871 until his death, was its chairman. *A Memorial of Joseph Henry* was published by order of Congress in 1880.

**His Writings.** His published papers include over 150 titles. In 1886 two volumes of the *Scientific Writings of Joseph Henry* were published by the Smithsonian Institution.

**HENRY, O.** See PORTER, WILLIAM SYDNEY.

**HENRY, PATRICK** (1736-1799). If the accounts of those who heard him are to be trusted, Patrick Henry was the most eloquent orator of his time. How unfortunate that we have no shorthand accounts of his addresses, no phonograph records which would reproduce both his



Photo: Brown Bros.

PATRICK HENRY

The stirring orator of the Revolutionary period.

language and his intonations. For true oratory lies not in words nor tricks of gesture, but in the emotional impulse which is communicated to the hearer. On this point the testimony of Patrick Henry's contemporaries is clear. Of this man, who at the age of twenty-eight was called the "Orator of Nature," it has been said by one who heard many of his speeches:

He is by far the most powerful speaker I ever heard. Every word he says not only engages but commands the attention; and your passions are no longer your own when he addresses them. But his eloquence is the smallest part of his merit.

Born May 29, 1736, in Hanover County, Va., of Welsh and Scottish descent, Henry was endowed with a remarkable conversational ability and the keenest powers of observation. Although he left school at an early age, he was instructed by his father, who was an educated man, and he possessed the type of mind which



Photo: Visual Education Service

## THE FAMOUS SPEECH IN THE HOUSE OF BURGESSES

The artist portrayed the scene at the moment when an indignant fellow member interrupted the speaker with the cry of "Treason!" The chairman is shocked at the vehemence of the orator, also, and appears ready to spring from his chair.

is capable of self-discipline. He remembered what he read and made it his own by observation and reflection. In 1760 he was licensed to practice law, upon promising to continue his study, and this promise he faithfully kept. However, his brilliant speeches in a noted lawsuit called the Parson's Cause, were stepping-stones to fame, and he suddenly found himself a power in the community.

Henry was an earnest advocate of the rights of the colonies as guaranteed by their charters, so when he became a member of the Virginia House of Burgesses (1765), he stood forth as the people's popular representative against the aristocratic faction. In May, 1774, he was elected a delegate to the First Continental Congress. A year later, while attending the Virginia Provincial Convention, in reply to the objections to his proposal to organize a militia

for the defense of the colonies against England, he made the most famous speech of his life; from it the following is quoted:

'There is no retreat but in submission and slavery. Our chains are already forged. Their clanking may be heard on the plains of Boston. The next gale that sweeps from the north will bring the clash of resounding arms. Our brethren are already in the field. Why stand we here idle? What is it that gentlemen wish? What would they have? Is life so dear or peace so sweet as to be purchased at the price of chains and slavery? Forbid it, Almighty God! I know not what course others may take, but as for me, give me liberty or give me death!'

In 1776 Henry was chosen a member of the committee to prepare the first constitution of the commonwealth of Virginia, and the same year was elected governor of that state, a post which he held for two terms, from 1776 to

1779 and from 1784 to 1786. Later, at different times he was offered a seat in the United States Senate, the position of Secretary of State

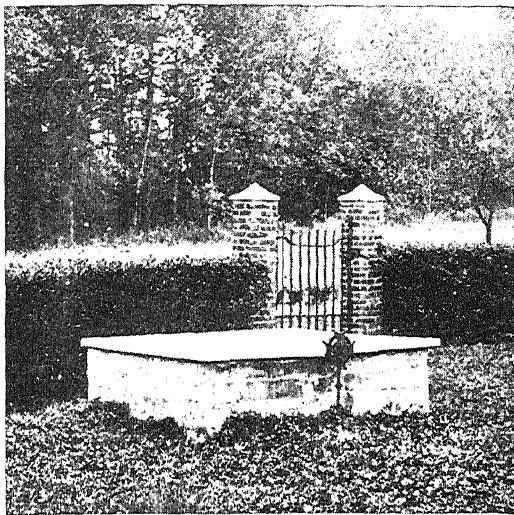


Photo: Wide World

TOMB OF PATRICK HENRY

Recently dedicated by the American Legion as a monument to the cause of liberty.

(under President Washington), the office of Chief Justice of the United States Supreme Court, and reelection as governor, each of which he refused. In 1799 he was elected to the Virginia House of Delegates, but died on June 6 of that year, before taking his seat.

Henry was not remarkable in appearance, and though sometimes careless in his dress, he was never slovenly. His manner was mild and kindly. He was quiet and self-controlled, and very considerate of the welfare of others. Although his early years were marked by poverty, he attained independence and a substantial estate in later years.

He was buried at Red Hill, his estate located about thirty miles south of Appomattox. On the plain marble slab which covers his grave is the inscription: "His fame is his best epitaph."

E.U.G.

**HENRY IV.** See SHAKESPEARE, WILLIAM (Synopses of the Plays).

**HENRY V.** See SHAKESPEARE, WILLIAM (Synopses of the Plays).

**HENRY VI.** See SHAKESPEARE, WILLIAM (Synopses of the Plays).

**HENRY VIII.** See SHAKESPEARE, WILLIAM (Synopses of the Plays).

**HENRY FREDERICK,** Duke of Mecklenburg-Schwerin, Prince Consort, husband of Queen Wilhelmina of the Netherlands. See WILHELMINA.

**HENRY THE FOWLER.** See GERMANY (History: A Troubled Time).

**HENRY THE LION.** See BRUNSWICK, FAMILY OF.

**HENRY THE NAVIGATOR** (1394-1460), fifth son of John I of Portugal and grandson of an Englishwoman, Philippa of Gaunt. Prince Henry did much to encourage various explorers, and from time to time sent vessels on voyages of discovery, being influenced largely by what Marco Polo had told in his book (see POLO, MARCO). His great life ambition was to explore parts of the unknown world. One of the results of his efforts was the discovery of the shape of the great continent of Africa. Under his inspiration, Portuguese sailors found their way to Brazil. There, later, gold and diamond mines were developed which brought great wealth to Portugal, for that country thenceforth claimed the vast eastern section of South America (see DEMARCTION, LINE OF). The Madeira Islands were reached by Henry in 1420, and the Azores in 1448, and for the next fifty years the commerce and colonial possessions of the Portuguese were steadily developed in Brazil and India, because of the impulse he imparted. He also founded a school for navigation at Sagres, and built an observatory near Cape Saint Vincent. See PORTUGAL (Expansion by Exploration).

**HENSCHEL, hen' shel, GEORG** (1850- ), a German-English musical composer, singer, and director, who established the famous London Symphony Concerts and was the first conductor of the Boston Symphony Orchestra. He made his first public appearance as a pianist, when twelve years of age, at Breslau, his native city, later studying at Leipzig and Berlin. His fine baritone voice soon gained him recognition, and he entered the field of grand opera. In 1877 he began a successful career in England as a teacher, singing also at leading concerts. In 1881 he married an American soprano, Miss Lillian Bailey. He composed several songs, operas, and orchestral pieces; his outstanding work is the magnificent Latin hymn, *Stabat Mater*. Both in England and in America, Henschel has exerted a strong influence in musical circles.

**HENTY, GEORGE ALFRED** (1832-1902), an English author of scores of books for boys. These have no especial literary merit but this fact does not disturb their juvenile readers. Something happens on every page; the heroes, many of them boys themselves, achieve success in the face of tremendous obstacles, and



Photo: Brown Bros.

GEORGE A. HENTY

in the background are stirring historical scenes. Libraries often find it difficult to supply the demand for "Henty books." The stories are clean, and they exalt physical and moral courage. Henty, who was born at Trumpington, in Cambridgeshire, was not always a writer of boys' books. After his graduation from Caius College, Cambridge, he served for a time in the army, and in 1866 became a war correspondent, reporting for a London paper the Austro-Italian and Franco-German wars, as well as expeditions to the interior of Africa. He was a man of middle age before he wrote his first juvenile story, and produced about eighty in all. The titles of some of these are *In the Irish Brigade, With Buller in Natal, The Treasure of the Incas, With Clive in India, and With Wolfe in Canada.*

**HEPATICA**, *he pat' i kah*, a sturdy but dainty flower of the woodlands in nearly all countries of the northern hemisphere. Its name comes



Photo: Visual Education Service

HEPATICA TRILOBA

from the Greek word for *liver*, suggested by the shape of the leaves, and the plant is often called *liverleaf* or *liverwort*. There are two well-known American species, one with leaf lobes rounded, more common in Eastern America, and one with pointed leaf lobes, common in the West.

If the ill-smelling skunk cabbage be excepted, the hepatica is the first flower to appear in spring from Canada to Northern Florida. When snow is still on the ground, hepaticas of white, pink, blue, or lavender may be seen nodding in warm, sheltered places, especially in open woodland, each on a slender, hairy stem. The blossoms have six sepals, and are shaped like buttercups. They appear before the new green leaves rise above the

leaves of last year, which are three-lobed, dark-colored, and leathery.

B.M.D.

**Scientific Names.** The hepaticas constitute a genus in the buttercup family, *Ranunculaceae*. The species with rounded lobes is *Hepatica hepatica* or *triloba*; the sharp-lobed species is *H. acuta*.

**HEPATIC**, *he pat' ik*, **ARTERY**. See LIVER.

**HEPATIC DUCT**. See GALL BLADDER.

**HEPHAESTUS**, *he fes' tus*, the Greek name of the god Vulcan (which see).

**HEPPLEWHITE, GEORGE**. See FURNITURE (English Development).

**HEPTAMERON**, a collection of stories made in the time of Marguerite of Valois (1553-1615), wife of Henry IV of France. Their inspiration was the *Decameron* of Boccaccio. The storytellers in the *Decameron* fled from the pest in Florence; in the *Heptameron*, ten men and women, caught in a Pyrenees storm, passed the time by each telling a story every day for ten days. Only those for seven days and two of the eighth day are preserved. See DECAMERON.

**HEPTAMETER**, *hep tam' e tur*. See METER.

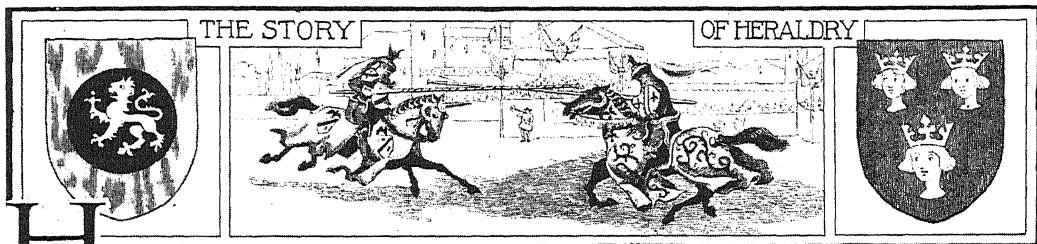
**HEPTARCHY**, *hep' tahr kie*, the name formerly given to the seven divisions of England established by the Angles and Saxons. These kingdoms were Kent, Sussex, Wessex, Essex, Northumberland, East Anglia, and Mercia. They were founded at different times, and were for years constantly at war with one another. In 827 Wessex, under Egbert, achieved supremacy and virtually absorbed the others, their consolidation marking the beginning of the modern kingdom of England and the British Empire. Egbert is thus considered to have been the first king of England. See EGBERT.

**Derivation.** The word *heptarchy* is derived from the Greek *hepta*, meaning seven, and *arche*, or kingdom.

**HERA**, *he' rah*. See JUNO.

**HERACLIUS**, *hehr ah kli' us*, a Byzantine emperor. See BYZANTINE EMPIRE.

**HERALD**. In the days when there were no modern means of communication, a ruler made known his orders and his requests through officers known as *heralds*. In ancient Greece and Rome, the heralds appeared in the public squares and summoned the assemblies or announced some exciting piece of news, such as the approach of a hostile army. In medieval times, the duties of heralds multiplied, and their importance increased in comparison (see article following, HERALDRY). Their costumes were gorgeous in the extreme, and their journeys from one court to another were attended with all sorts of elaborate ceremonials. As the direct representatives of the king, they were regarded as possessing in some measure the sacredness of royalty, and it was a crime to interfere in any way with a herald's performance of his duties.



**H**ERALDRY. It is always interesting to read, in the old romances, of the coats of arms borne by the noble knights. One may not know what a "lion *passant* on a field *or*" really means, but it is nevertheless fascinating. It seems a subject far removed from science, and yet there is a science of coats of arms, or, as they are more technically called, *armorial bearings*. This science is *heraldry*, which in many countries is in charge of a special body of men. In England, for example, there is the Heralds' College, without whose authority no family may adopt a new coat of arms or assume one which their ancestors bore.

**What Coats of Arms Mean.** It used to be the chief pride of a warrior to keep his shield burnished like a mirror, for it was just a plain surface of metal with never a mark save those which had been made upon it by the spears of enemies. But when the Crusades began, in which knights from all over Europe took part, it was found confusing to have no distinguishing mark. The armor was all alike, the shields differed little from each other, and the visored helmet concealed the face. Gradually, therefore, there grew up the custom of emblazoning upon the shining surface of the shield some device by which the owner might be known. The choice of such a device was influenced by many considerations. Many knights chose the lion, a symbol of bravery, or the leopard, emblem of watchfulness and cunning; others the stag, with its proudly held head; the eagle, the swan, or the peacock. Plants, too, were made use of—perhaps some flower which grew about the ancestral manor, or some herb which was a favorite family remedy. That these coats of arms should become hereditary was to be expected, for, naturally, the second generation felt pride in the devices which the fathers had honorably worn.

All of this, however, was most informal, each man simply choosing what he pleased; and the result was that there were frequent duplications, and confusion was constant on the field of battle. Under the royal direction, therefore, officers called *heralds* were empowered to supervise all coats of arms, so no one's rights might be infringed upon. As customs and manners of dress changed, the coat of arms was no longer blazoned on the shield or embroidered on the outer coat, but it continued to have its

place, and many an old family of England, whose coat of arms has come down through the centuries, is prouder of that insignia than of its material possessions.

**Some Interesting Examples.** Heraldry is by no means a simple science. It demands an extensive knowledge and the ability to recognize the slightest shades of distinction. Here it is not possible to treat the subject fully, but some of the simpler terms, which are frequently met with in reading, may well be made clear.

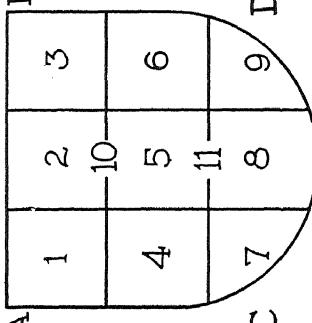
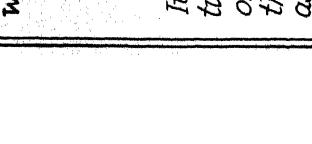
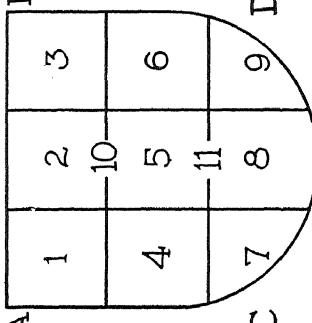
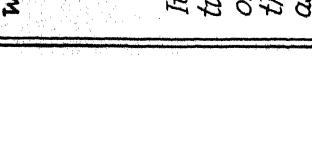
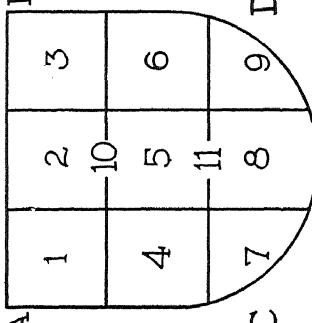
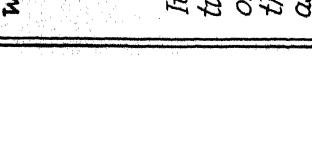
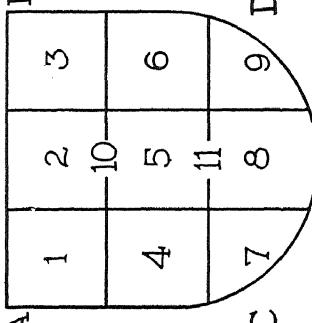
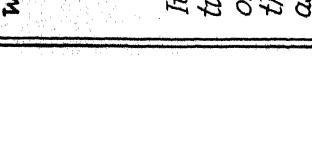
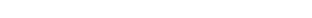
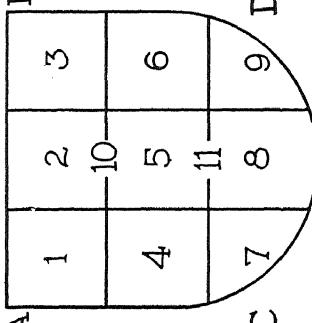
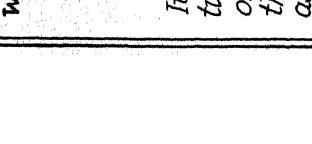
First, there is the *escutcheon*, which is the background for all armorial bearings. This is shield-shaped, to denote its origin. The term is frequently used figuratively, to signify the honor of the family, and a "blot on the escutcheon" refers to any disgrace incurred by a member.

The second point to be noted is the color of the field, or, as it is technically called, the *tincture*. There are two metals, gold and silver, known by their French names of *or* and *argent*; and there are five colors, red, blue, black, green, and purple, called respectively *gules*, *azure*, *sable*, *vert*, and *purpure*.

The figure or device inscribed on an escutcheon is known as a *charge*, and charges are of infinite variety. Some are mere designs in straight lines, but the most interesting are conventionalized pictures of natural or fabulous animals. Most popular of all is the lion, which is shown in a number of positions. Since references to these are scattered casually through literature, it will be worth while to explain a few of the terms.

A lion *rampant* stands erect on his hind legs and claws the air with his forefeet. A lion *passant* is shown in walking position, looking straight ahead. *Couchant*, he is on the ground, with his head raised; *dormant*, he is asleep; and *statant*, he stands with all four feet firmly on the ground. This little discussion will make clear the reference in the first paragraph to a "lion *passant* on a field *or*." This means simply a lion in walking posture on a gold field.

**National Coats of Arms.** If an individual feels the need of a coat of arms to mark his descent and his dignity, so much the more does a great country, and most of the nations of the world make use of such devices. In monarchies, the national coat of arms is almost always that of the royal family, and those of some

| WREATH or BANDEAU   |  | PRINCIPAL TINCTURES  |  | SUPPORTERS  |  | A   |  | B   |  | C   |  | D   |  | E   |  | F   |  | G   |  | H   |  | I   |  | J   |  | K   |  | L   |  | M   |  | N   |  | O   |  | P   |  | Q   |  | R   |  | S   |  | T   |  | U   |  | V  |  | W   |  | X   |  | Y           |  | Z                 |  |        |  |                |  |                     |  |         |  |          |  |                    |  |        |  |                 |  |                   |  |         |  |              |  |           |  |          |  |          |  |           |  |             |  |                    |  |
|---------------------|--|--|--|---|--|---|--|---|--|---|--|---|--|---|--|---|--|---|--|---|--|---|--|---|--|---|--|---|--|---|--|---|--|---|--|---|--|---|--|---|--|---|--|---|--|---|--|--|--|---|--|---|--|-------------|--|-------------------|--|--------|--|----------------|--|---------------------|--|---------|--|----------|--|--------------------|--|--------|--|-----------------|--|-------------------|--|---------|--|--------------|--|-----------|--|----------|--|----------|--|-----------|--|-------------|--|--------------------|--|
| DIVISIONS           |  | GOLD   |  | SILVER  |  | BLUE  |  | RED   |  | BLACK   |  | GREEN   |  | PURPLE  |  | LINES TO DIVIDE SHIELD  |  | THE FILE or LABEL   |  | Mark of eldest son  |  | Engrailed   |  | Mark of second son  |  | Invected  |  | Onde'   |  | THE CRESCENT  |  | Mark of third son   |  | Nebule'   |  | Vert  |  | THE MULLET  |  | Mark of fourth son  |  | Indented  |  | Sable   |  | THE MARTLET   |  | Mark of fifth son  |  | Dancette  |  | Embossed  |  | THE ANNULET |  | Mark of sixth son |  | Potent |  | THE FUR-DE-LYS |  | Mark of seventh son |  | Roughly |  | THE ROSE |  | Mark of eighth son |  | Dotted |  | THE CROSS MOINE |  | Mark of ninth son |  | Rayonne |  | The Octofoil |  | The Cross |  | The Bend |  | The Pale |  | The Party |  | The Bendlet |  | The Party per pale |  |
| POINTS OF THE FIELD |  | OR   |  | AZURE   |  | ARGENT  |  | GULES   |  | SABLE   |  | VERT  |  | PURPURE   |  | ERMINÉ  |  | Vairy   |  | THE Fesse   |  | The Bar   |  | The Chevron   |  | The Cross   |  | The Saltire   |  | The Pale  |  | The Bend  |  | The Party   |  | The Bendlet   |  | The Party per pale  |  |   |  |   |  |   |  |   |  |  |  |   |  |   |  |             |  |                   |  |        |  |                |  |                     |  |         |  |          |  |                    |  |        |  |                 |  |                   |  |         |  |              |  |           |  |          |  |          |  |           |  |             |  |                    |  |
| WREATH or BANDEAU   |  | A  |  | B   |  | C   |  | D   |  | E   |  | F   |  | G   |  | H   |  | I   |  | J   |  | K   |  | L   |  | M   |  | N   |  | O   |  | P   |  | Q   |  | R   |  | S   |  | T   |  | U   |  | V   |  | W   |  | X  |  | Y   |  | Z   |  |             |  |                   |  |        |  |                |  |                     |  |         |  |          |  |                    |  |        |  |                 |  |                   |  |         |  |              |  |           |  |          |  |          |  |           |  |             |  |                    |  |
| WREATH or BANDEAU   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |             |  |                   |  |        |  |                |  |                     |  |         |  |          |  |                    |  |        |  |                 |  |                   |  |         |  |              |  |           |  |          |  |          |  |           |  |             |  |                    |  |
| WREATH or BANDEAU   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |             |  |                   |  |        |  |                |  |                     |  |         |  |          |  |                    |  |        |  |                 |  |                   |  |         |  |              |  |           |  |          |  |          |  |           |  |             |  |                    |  |
| WREATH or BANDEAU   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                         |  |  |  |   |  |             |  |                   |  |        |  |                |  |                     |  |         |  |          |  |                    |  |        |  |                 |  |                   |  |         |  |              |  |           |  |          |  |          |  |           |  |             |  |                    |  |
| WREATH or BANDEAU   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                         |  |  |  |   |  |             |  |                   |  |        |  |                |  |                     |  |         |  |          |  |                    |  |        |  |                 |  |                   |  |         |  |              |  |           |  |          |  |          |  |           |  |             |  |                    |  |
| WREATH or BANDEAU   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | <img alt="Diagram X: A wreath or bandeau divided into二百三十二 segments labeled 1 through 232." data-bbox="280 |  |   |  |   |  |             |  |                   |  |        |  |                |  |                     |  |         |  |          |  |                    |  |        |  |                 |  |                   |  |         |  |              |  |           |  |          |  |          |  |           |  |             |  |                    |  |

countries show in their changes every variation in the line of descent. This has been true in England, where the arms of France, of the House of Orange, and of the House of Hanover formerly appeared, but the British coat of arms has been simplified so that it bears the three lions of England, the rampant lion of Scotland, and the harp of Ireland. Below the shield appear the English rose, Irish shamrock, and Scottish thistle; about it is the ribbon of the Garter; and above are the royal crown and a crowned lion. See GARTER, ORDER OF THE.

In the United States, there were no devices which had been handed down through the centuries, and it was consequently necessary to decide upon some appropriate symbol. On June 20, 1782, there was adopted the coat of arms, or, as it is more commonly called, the *great seal*, which is in use to-day. It shows the American eagle, bearing on its breast a shield with thirteen stripes and thirteen stars, holding in its beak a scroll with the words *E pluribus unum*, and in its claws an olive branch and a sheaf of arrows. Canada has a Dominion coat of arms which shows the seals of the four original provinces—Ontario, Quebec, Nova Scotia, and New Brunswick—but this is not used as is the seal of the United States. Instead, there is a great seal, bearing as its central figure the ruling sovereign of Great Britain. Each province of Canada, and each state in the United States, has its own seal.

**HERAT**, *hehr' aht*, a city in Afghanistan. See AFGHANISTAN (Cities).

**HERBARIUM**, *hehr' bə' rih' um*, a classified, systematically arranged collection of dried plants. As the study of living plants in their natural surroundings is possible only in a limited way, herbariums are invaluable in school work, plant study, and, in a large way, as a material record of the vegetation of the earth. The best herbariums have specimens of plants from which the original descriptions of the various species were made. Those specimens are called *types*. By studying them in comparison with existing plants, relationships can be established and histories of plant families read. Next in importance to type specimens are specimens of plants obtained from comparatively inaccessible regions, sent in by collectors who daily risk their lives in the cause of science.

Herbarium plants are usually mounted on sheets of white paper, and the best specimens show root, leaf, flower, and fruit. These sheets are marked with the name of the species, natural color, etc., name of collector, and date and place of gathering.

The oldest and one of the greatest herbariums in the United States is the *Gray Herbarium*, the labor of the great botanist, Asa Gray, and given by him to Harvard University. Ranking with it are the herbarium of the New York Botanical Garden, the United States na-

tional herbarium, the herbarium of the Missouri Botanical Garden, and the herbarium of McGill University, Montreal. In addition to these, there are numerous smaller ones in museums and colleges throughout America.

In the herbarium of the Jardin des Plantes of Paris, there are a great many of the type specimens from which American plants were named. The greatest of all dried plant collections is in Great Britain, at the Kew Gardens. B.M.D.

**HERBART**, *hehr' bahrt*, JOHANN FRIEDRICH (1776-1841), a German philosopher and the founder of modern pedagogy. Few philoso-

phers or educators of any time or country have had a wider and more lasting influence than he. Herbart was born at Oldenburg, and his life, despite the fact that it came to maturity during the troubled times of the French Revolution and its succeeding wars, was a peaceful one. He studied at the University of Jena, and was there a pupil of Fichte, whose philosophy he adopted ardently for a time, but later rejected. He taught at the University of Göttingen, at Königsberg, and then again at Göttingen, where he died. Such was his uneventful career. The wars of Germany did not attract him; never, so far as is known, did he even think of carrying a weapon in its battles, but he helped to establish for his country a high place in the world of thought.

**His Place in Education.** His educational doctrine was the outgrowth of his philosophy, and his writings on education have exerted great influence upon the systems of education in Europe and America. Herbart believed that all subjects are related, and that the knowledge of one is strengthened by knowledge of others. He was the originator of the doctrine of apperception, which means the interpreting of new knowledge by the knowledge already in the mind (see APPERCEPTION). His entire system is based upon the idea that the end and aim of education is the development of the individual, whom he places above the family or the state. In his system of instruction, morality held the chief place. He placed special stress upon the development of interest, which, before his time, had received little attention. He advocated the correlation and unification of studies, and such methods of instruction as



Photo: Brown Bros.

#### HERBART

He believed continuous evolutionary growth to be the basic principle of the world, and he applied it to methods in education.

would vitalize school subjects and make them real to the children.

Herbart founded a pedagogical seminary at Königsberg, to which students came from other European countries and from the United States. Although the institution was compelled to close in 1833 because of the hostility of the Prussian government, it continued long enough to train a number of men who established Herbart's system in other countries, so that we can truly say that the Königsberg Seminary was the institution in which the "New Education" had its birth.

**Writings.** His works, most of which have been translated into English, include *General Pedagogy*, *Introduction to Philosophy, Application of Psychology to the Science of Education*, and *A B C of Sense-Perception*.

**HERBERT, VICTOR** (1859-1924), one of the most popular composers of his time, and also widely known as an orchestra conductor. He was born in Dublin, Ireland, but for thirty-eight years his was a familiar and beloved name to the American musical world. Herbert came of a musical family, and mastered the violoncello in his youth. After playing in various European orchestras, he came to America to appear as soloist with the Metropolitan Orchestra in New York, and subsequently was connected with the Theodore Thomas and Anton Seidl orchestras. In 1893 he succeeded Patrick S. Gilmore as bandmaster of the famous Twenty-second Regiment Band; from 1898 until 1904 he was conductor of the Pittsburgh Symphony Orchestra. In the latter year, he toured the United States with an orchestra of his own selection.

**Herbert as a Composer.** The exquisite melodies of Herbert's long list of light operas are enduringly popular. Songs come and go, but his *Kiss Me Again*, *Sweethearts*, *Gypsy Love Song*, and others are as refreshing to-day as when first composed. Of the two score operettas and musical comedies from his pen, the best-known include *The Serenade*, *The Fortune Teller*, *Babes in Toyland*, *Mlle. Modiste*, *Naughty Marietta*, *Princess Pat*, *Sweethearts*, *Angel Face*, *Orange Blossoms*, and *The Dream Girl*. He also composed the score for two editions of the *Follies*, and overtures and special music for several moving-picture productions. His instrumental compositions, especially the *Second Concerto* for violoncello, have superior merit, and he is represented in the field of grand opera by *Natoma* and *Madeleine*.



VICTOR HERBERT

Photo: U & U

**HERBICIDES**, *hur' bih sydz*, chemical preparations employed to kill weeds (which see).

**HERBS**, *urbz*, in botany, a term applied to all plants which contain no woody tissue and usually die down to the ground when their growing season is over. On this general basis, we distinguish herbs from shrubs and trees (both of which see). The word comes from the Latin *herba*, meaning grass, green stalks, or blades. In popular usage, however, it refers to herbaceous plants of economic value used for their flavor in cooking, for their scent in perfumes, or for their properties in medicine. Different parts are employed for these purposes. Some herbs are valued for their leaves, as balm and sage; some for their buds and flowers, as capers and saffron; others have aromatic roots, as ginseng; fennel is valued for its seeds; vanilla for its fruit pods.

Sweet herbs were among the first plants cultivated in Europe, for in materially changing the flavors of meats by their use, it may be said that almost a new animal food was created for the meat-loving Romans. Many herbs once highly prized, however, are seldom used to-day. It is true that they have little or no food value, but they make dishes savory and prove an economy in making very palatable dishes of "left-overs." A garden of old-fashioned herbs would be not only interesting, but useful. Most of them can be grown with little care. Planting in good, well-worked soil in a sunny spot, keeping the surface soil loose, and removing weeds are the chief special attentions necessary.

B.M.D.

**Related Subjects.** The plants listed below are described elsewhere in these volumes. They are the more important of those usually classed as herbs in the economic sense of the term. See also lists following the articles SPICE and MEDICINE AND DRUGS.

|               |            |
|---------------|------------|
| Balm          | Lavender   |
| Boneset       | Marjoram   |
| Catnip        | Peppermint |
| Chicory       | Rosemary   |
| Cicely, Sweet | Sage       |
| Elecampane    | Spearmint  |
| Fennel        | Spikenard  |
| Ginseng       | Tansy      |
| Horehound     | Thyme      |
| Horse-Radish  | Vanilla    |

**HERCULANEUM**, *her ku la' ne um*, an ancient city of Italy, memorable not for its life but for its death, which was brought about by the same volcanic eruption that destroyed Pompeii. It stood at the foot of Mount Vesuvius, five or six miles from Naples, and its fortifications and its artistic treasures were known throughout Italy. It was shaken by an earthquake in A. D. 63, but the damage was repaired. Sixteen years later, in A. D. 79, came the great eruption of Vesuvius, and Herculaneum perished. Again and again, through the centuries, Vesuvius poured out its lava and ashes, and the last trace of the city was lost. Scholars looked for it, but never found it, and



Photo: U & U

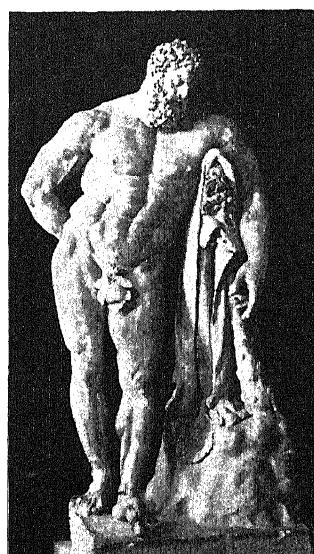
**Old Herculaneum Revealed.** This street once resounded to the clamor of city life, but was buried and silenced for seventeen centuries. The buildings above are modern, and were erected as headquarters for excavators.

villages grew up above its site. In 1709, in one of these villages, a farmer sank a well, and there, far below the surface, were found marble sculptures. Ten years later, another shaft was sunk, and the old theater was discovered, but little was done toward further excavation until 1738, when the government of Naples took up the task.

The depth of the lava that buried Herculanum is much greater than that of Pompeii, and it is correspondingly hard to remove. Since 1926, when the work of excavation was renewed on a large scale, many remarkable relics have been recovered. Recent excavations have disclosed houses with their second stories intact. The new method of excavation employed makes it possible to preserve the second stories and to take casts of doors and balconies. These casts are to be used in place of the destroyed originals. In one of these houses were found an atrium and peristyle, and a beautiful mosaic shrine.

Throughout the centuries, tunnels have been dug by robbers into the side of the city. Its site is honeycombed with these tunnels, and it is believed that, through this means of approach, many priceless works of art were carried off. However, the National Museum at Naples has a wonderful exhibit of marble and bronze statues, of paintings, and of papyrus rolls, taken from the buried city. The manuscripts, from their long burial, are so discolored and brittle that it has been a task of extreme delicacy to unroll and decipher them, but some have well repaid the trouble. See POMPEII; VESUVIUS; PLINY (the Elder).

**HERCULES,** *hur'ku leez.* The mighty deeds of this mythological hero of the ancient Greeks have made his name synonymous with strength and valor throughout the ages. In the myths of Hercules, the ancients gave expression to their worship of all that was manly and heroic. Hercules was said to be the son of Zeus, the greatest of the gods, and Alcmene, a princess of mortal origin. When the tidings



FARNESE HERCULES  
In the National Museum,  
Naples.

of his birth were conveyed to Hera (Juno of the Romans), queen of the gods, she determined that the child of her rival should perish, and forthwith sent two gigantic serpents to the palace where he was lying in his cradle. Just as they were about to crush him in their folds, the baby Hercules caught them by the neck and strangled them.

The education of the boy was supervised by Chiron, a famous centaur, who taught him the use of all weapons and gave him training in the various athletic sports. When his education was completed, he went forth into the world, and in the course of time was happily married to Megara, daughter of Creon, king of Thebes. While he was enjoying a peaceful and prosperous life, Hera, still his bitter enemy, caused him to be seized with madness, and in this condition he killed his wife and three children. When he regained his reason he suffered untold agony and remorse for his terrible deed, to atone for which he offered his services to his cousin Eurystheus, king of Argos. Twelve mighty labors were imposed by his royal master as deeds of atonement. Says Theocritus:

Unto this thy son it shall be given  
With his broad heart to win his way to heaven;  
Twelve labors shall he work; and all accurst  
And brutal things o'erthrow, brute men the worst.

**The Twelve Labors.** (1) The first labor was the destruction of a bloodthirsty lion which had made its lair in the Nemean Forest. Boldly entering the den of the monster, he grasped it by the throat and strangled it to death, after which he made for himself a coat of its shaggy skin.

(2) For his second task, he slew the Hydra, a seven-headed serpent that was ravaging the marshes of Lerna.

(3) The third labor imposed by Eurystheus was the capture of the golden-horned stag of Cerynea, whose brazen feet carried him along so swiftly they seemed scarcely to touch the ground. Hercules overtook this fleet animal after a long, weary chase, but succeeded in capturing him only by driving him into a far northern snowdrift from which he could not make his escape.

(4) The capture of the wild boar of Erymanthus, in Arcadia, was his fourth desperate adventure. In the midst of this labor, he was attacked by the centaurs, whom he vanquished by turning upon them his death-bringing arrows.

(5) Hercules was next commanded to cleanse the stables of Augeas, king of Elis, to accomplish which he used the rushing torrent of the River Alpheus.

(6) For his sixth task, he was sent forth to slay the brazen-clawed birds that hovered over the waters of Lake Stymphalus, and that ate of human flesh. With his poisoned arrows he destroyed the entire flock of these savage birds.

(7) His seventh labor was the capture of a mad bull given by Neptune to Minos, king of Crete, which in its frenzy was laying waste the entire island.

(8) He next journeyed to Thrace, whose king, Diomedes, owned a number of beautiful horses that fed on human flesh. As his eighth labor, Hercules delivered these fearful steeds to Eurystheus.



Slaying the Hydra. In the second of the twelve labors, Hercules slays the seven headed Hydra. His friend Iolaus stands by to cauterize the stumps as the heads are severed, to prevent immediate regrowth. See HYDRA.



(9) On his ninth adventure, he visited the country of the Amazons, to obtain for the daughter of Eurystheus the girdle worn by the Amazon queen, Hippolyta. This prize he bore away only after he had fought and defeated the warlike race of women, who were misled by Hera into believing that the hero had come to kidnap their queen.

(10) His tenth task was the capture of the oxen of Geryon, a creature with three bodies who made his home in the island of Erythea. This island lay far to the west, bathed in the light of the setting sun, and to reach it Hercules had to pass through many different countries. When he came to the frontiers of Libya and Europe, he raised as memorials of his journey the two mountains of Abyla and Calpe, the famous Pillars of Hercules. On reaching Erythea, he slew the warders of the oxen, the giant Eurytion and his two-headed dog, and bore his trophies back in triumph to Eurystheus.

(11) Even more difficult than this was the eleventh labor, the seizure of the golden apples of the Hesperides (which see). To secure these he must needs ask the help of Atlas, father of the Hesperides, who—

"With head inclined and ever-during arms,  
Sustains the spacious heavens."

Hercules himself bore on his shoulders the mighty burden while Atlas plucked the glittering fruit from the gardens.

(12) His final task was the most difficult of all, the descent into the realm of Pluto, the god of the lower world, to bring up the dog Cerberus, grim guardian of Hades. When he laid the ferocious monster at the feet of Eurystheus, that king fled in terror and hid himself in a huge jar.

**After His Atonement.** When all his labors were completed, the hero wandered forth to enjoy the happiness of long-desired freedom. Too soon, however, was he forced to return to bondage, for, having slain his friend Iphitus in a fit of anger, he was condemned to serve Omphale, queen of Lydia, for a period of three years. Omphale clad herself in his lion's skin and made her hero-slave dress in a woman's garb, while with awkward hands he worked at spinning.

After he had been released from the Lydian queen, he married Deianira, who accompanied him in his wanderings. One day they came to a rapidly flowing stream, across which Deianira was carried by the centaur Nessus. The centaur, on reaching the opposite shore, started to run away with his fair burden, and Hercules, hearing her cries, shot her captor with one of his poisoned arrows. Nessus, with his dying breath, bade Deianira dip in his blood a robe of Hercules, which he said would bring back her husband's love if ever it wandered from her.

When, sometime later, she became jealous of Iole, a captive maiden, she unwittingly sent to Hercules the robe, poisoned with the blood of Nessus. The hero at once put it on, and as the poison penetrated his body, in a frenzy

of pain he tried to wrench away the garment, but only tore off great pieces of his own flesh. In his agony he uprooted great pines, and Lichas, who had brought the robe to him, he flung into the sea from the heights of Mount Oeta. Finally, to end the unbearable pain, he erected a huge funeral pile on the mountain, laid himself upon it, and commanded his friend Philoctetes to apply the torch. When the flames had consumed all of him that was mortal, great Zeus descended from heaven and bore away his soul to the abode of the gods, where, wedded to the goddess Hebe, he lived in everlasting happiness.

E.D.F.

**In Art.** There are several famous representations of Hercules in painting and sculpture. The original of the illustration, reproduced herewith, the *Farnese Hercules*, is in the National Museum at Naples. Other notable works on the subject include the *Infant Hercules Strangling a Serpent* (antique sculpture) in the Uffizi at Florence; C. C. Cleyre's painting, *Hercules at the Feet of Omphale*, in the Louvre, Paris; and Guido Reni's painting, *Hercules Fighting the Hydra*, also in the Louvre.

**Related Subjects.** The reader will add to his knowledge of the mythical Hercules by referring in these volumes to the following articles:

|                |                      |
|----------------|----------------------|
| Amazons        | Hebe                 |
| Atlas          | Hercules, Pillars of |
| Augean Stables | Hesperides           |
| Cerberus       | Hydra                |
| Chiron         | Juno                 |

**HERCULES, PILLARS OF**, an ancient name given to the two rocks at the sides of the narrow entrance to the Mediterranean Sea at the Strait of Gibraltar. One pillar, on the European side, was called Calpe; the other, on the African side, Abyla. The ancient Greeks ascribed their erection to Hercules, on the occasion of his journey to the kingdom of Geryon. A thousand years before Christ, the pillars were crowned by silver columns erected by the Phoenician mariners to mark the limits of navigation; there is a legend to the effect that they bore a warning to over-ambitious mariners, in the words *Ne plus ultra* (no more beyond).

**HERCULES BEETLE**, a remarkably large and strong beetle, found in the West Indies. The male attains a length of five to six inches. The insect has long, curving horns projecting from the head and thorax; these are curved to meet each other and are used as forceps—

according to some authorities, as saws. The female is much smaller than the male, and has no horns. The rhinoceros beetles of the Southern and Western United States, similar in appearance, but smaller, are related species.

W.J.S.

**Classification.** These beetles belong to the family *Scarabaeidae*, which includes the June bugs and the scarab (which see), sacred to the ancient Egyptians.



HERCULES BEETLE

## HERCULES CLUB. See GOURD.

**HERDER**, *hehr' dur*, JOHANN GOTTFRIED VON (1744-1803), one of the founders of a national German literature. He lacked literary skill, but he opened new fields of thought, and in poetry, art, philology, religion, human evolution, and philosophy, applied his theory that human culture is the evolutionary product of national conditions.

Herder was born in Mohrungen, East Prussia, and remained there until he was eighteen. He studied at the University of Königsberg for two years, and developed an interest in literature. At the age of twenty-five, he won a prize, awarded by the Berlin Academy, for an essay on the best method by which a government can promote the intellectual life of a nation. The same year, he returned to Germany from Riga, where he had been assistant pastor at the cathedral. While in Strassburg, as tutor to one of the young German princes, Herder met Goethe, on whose poetic development he was to have so great an influence. Goethe obtained for Herder the position of court preacher at Weimar, which he retained until his death.

Although he was a favorite at the court, popular with the pupils at the gymnasium, where he introduced some of his ideas on school reform, and the center of a literary group, Herder was not happy at Weimar. He quarreled with Goethe, and was jealous of the success of others. His health was poor, and after his fiftieth year, he aged rapidly. For a long time after his death, his writings were neglected, but later critics have assigned him an important place in German literature. His greatest work is his *Philosophy of History*, in which he explains man's development in connection with his physical environment. He was not a creative poet, but translated popular folk songs of many countries. His work has been published in an edition of sixty volumes. See GERMAN LITERATURE.

## HERD'S GRASS. See TIMOTHY.

**HEREDITY**, *he red' it ie*. Herbert Spencer defines heredity as "the capacity of every plant and animal to reproduce other individuals of a like kind." The child is like the parent in form, structure, general characteristics, and habits of life. It does not bear a perfect resemblance to either parent, but usually has some characteristics of each. There are, however, certain characteristics pertaining to each child which vary from those of the parents, and of the other children. While these variations are numerous, they are minute as compared with the likenesses. Professor J. Arthur Thomson says, "The individual is like a lens into which rays from parentage and ancestry converge, from which they diverge again to the progeny."

**The Physical Basis of Heredity.** Granted that heredity is necessary to the maintenance of the stream of life, how does it operate in the organism? This is a subject to which biologists have given much study for many years, and about which they have discovered many important facts through microscopic and chemical study of cells, and from numerous breeding experiments. The present theory of heredity is most easily understood in connection with the reproduction of higher animals. The union of two germ cells, one from each of two parents, gives rise to a new cell by fertilization. The fertilized egg, which is the start of life for the new individual, divides into two cells; each of these divides again, and the process continues until the completed organism is built up. It requires most of the material in the fertilized egg to produce the muscle and bone, the nerves and blood and other tissues of an animal organism, but the remainder is set apart for the special purpose of forming reproductive organs of the new creature. In each new organism there are large numbers of cells which are kept intact for the propagation of new life at the proper time. These germ cells are regarded as distinct from the body, or *soma*, cells.

Heredity is a matter of the succession of germ cells. The hereditary material in these cells is called the *germ plasm*, and from a biological standpoint, heredity is an unbroken stream of germ plasm, flowing from generation to generation. The body dies, but the germ plasm is immortal; since life first appeared on our planet, there has never been an interruption of the main current. It is believed that the actual substance that carries the factors of inheritance is a protein found only in the cell nucleus. This substance, called *chromatin*, condenses into certain bodies called *chromosomes* when the cell is ready to divide. For each species there is a definite number of chromosomes in the fertilized egg, and this number is constant in every cell throughout the body of the organism. Within the chromosomes reside the units that determine the make-up of the individual; that is, all the characters that comprise the inheritance of the organism. These units, called *genes*, are described as packets of chemical substances having a definite arrangement relative to one another. One of the problems of modern biology has been the interpretation of inheritance in terms of the genes. The prevalent theory is that any particular character, such as color of eyes or hair, stature, shape of nose, etc., is determined by a special gene complex. One character may be determined by the interactions of many genes, or one gene may influence several characters. The variations that distinguish one individual from another, when they are a part of the inheritance of the organism, arise from

rearrangements, recombinations, and alterations of the genes.

There are peculiarities in each individual that arise from training, special conditions of the environment, change of habit, and so on. A weakling named Theodore Roosevelt became a strong, healthy man by vigorous exercise in the open. A person who loses his eyesight tends to become extremely deft with his fingers. Numerous other examples can be given. Most biologists believe that characteristics which arise from outside influences are not handed down from parent to offspring as such. As commonly stated, the trend of opinion is said to be against the "inheritance of acquired characters" (in this connection, see EVOLUTION). That is, variations may be inherited only if they arise from within; only if they are changes in the germ plasm. This theory is supplemented by the belief that changes in the body cells cannot be transmitted to the germ cells. The germ plasm is altered and modifies the organism; the organism does not change and transmit the change to the germ plasm. This is still a subject of some controversy, however, and biologists do not like to say, dogmatically, that no acquired character can be inherited. Many experiments to decide this point are being carried on, and the future may see a change in prevalent opinion.

**Laws of Inheritance.** Do the modes of inheritance follow any fixed rules that can be mathematically expressed? This question has been attacked by more than one student of heredity, and we have two well-known sets of laws that have been formulated through studies of this nature. Sir Francis Galton, father of the science of eugenics, is author of the following law of ancestral inheritance:

Of the entire heritage of the offspring, the two parents contribute one-half, the four grandparents one-fourth, the eight great grandparents one-sixteenth, and so on in diminishing ratio until the sum of the fractions equals one.

This law expresses the general truth that the farther the line recedes from a given pair of ancestors, the less is the resemblance of the offspring. Sir Francis, however, used data in his studies that fall within the limits of acquired characters, and we must look to another source for the scientific basis of inheritance.

**Mendel's Law.** Gregor Johann Mendel was an Austrian priest and biologist whose main scientific interest was botany. He published the results of his researches in 1865, eight years after he began his tests, but his work received no attention until 1900; the rediscovery of his paper in that year is a milestone in the history of biology. Mendel centered his attention on the inheritance of contrasting characters when different kinds of peas are crossed. He selected peas that grew on tall

vines and those that grew on short ones; some whose seeds were wrinkled and others with smooth seeds. He used peas of contrasting colors; peas with hard pods and peas with soft pods, and so on. By tracing these contrasting characters through a series of generations, he was able to formulate his law in precise terms.

Let us follow the results of his experiments. When he crossed tall peas with short ones, he found that the peas of the first generation were all tall like one parent. He therefore called tallness a dominant (*D*) character, and shortness a recessive (*R*). When he crossed other kinds, he found that smoothness of seed and softness of pod were dominant, that purple was dominant over white, and yellow over green. The next step was the inbreeding of the first generations. He self-fertilized the tall hybrids, and found that the crop consisted of 787 tall plants and 277 dwarf ones. A similar result appeared in all other tests. In the second generation, the *D* character always occurred in the ratio of about three to one. Mendel's law is expressed mathematically as follows:  $3D : 1R$ . It means that hybrids "split into the ratio of three to one." Continuing his experiment, Mendel discovered that the dwarfs always bred true, but that only one out of every three tall produced like progeny; the other two tall gave three tall to one dwarf.

Mendel saw plainly that an underlying principle was at the basis of these results, and his interpretation of the facts is the foundation of the modern theory of heredity. He pointed out that the individual itself is not the unit of heredity, but that each individual is a complex of many unit-characters which may be separated from one another and variously recombined. Mendel thought that each character had a special determiner in the germ cell, but modern research shows that two or more determiners (genes) may produce characteristics by interacting.

It is a significant fact that the results of Mendel's experiments have been duplicated over and over again, and Mendelian inheritance is held to be a general fact in the plant and animal world, though, of course, there are many elements in heredity that do not conform to a mathematical rule. In respect to man's inheritance, we know that brown eye color, night-blindness, and jointless fingers are Mendelian dominants, and that albinism, left-handedness, and deaf-mutism are recessives. For example, if an albino mates with a normal person, all the offspring will be normal. If the son of such parents should mate with the daughter of similar parents, three normal and one albino could be born to them. Two deaf-mutes, whose defects were inherited and not acquired, would have all deaf-mute children, since recessive characters breed true. By Mendelian principles, scientists can explain the

cropping out of an abnormal condition in a child of normal parents. Characters latent through several generations may appear again when a particular combination of genes is effected.

Because the breeding of plants can be more rigidly controlled than can that of animals, the application of Mendel's law is therefore of great practical importance to plant breeders.

R.H.

### Inheritance of Intellectual and Moral Traits

Inheritance is the term applied to the sum total of internal impulses that control the development of the individual. That there are such internal, directive impulses in development no one who has studied the development of animals can doubt. If we place in a finger bowl of sea water the egg of a sea urchin and the egg of a starfish, which are not distinguishable to the naked eye and can hardly be distinguished under the microscope, then, though we leave them under the identical environment of sea water, one will develop into a larva of one type and the other into a larva of a very different type. Each will develop into a type of larva that may be predicted. One cannot conceive that the differences between the larvae are merely "the product of their environment." If not, then heredity is a fact. The denial of heredity arises from those who take too narrow a view of the significance of the word. Such persons often have in mind a particular question, as, "Did this criminal's bad behavior result from heredity or environment?"

There is a question which is always being discussed when biologists and sociologists meet; namely, the relative importance of heredity and environment. Now, heredity against environment is one of those convenient antitheses that have come to us from the remote past and which have no meaning. There is no proper opposition between heredity and environment, any more than there is an opposition between the action of sulphuric acid and marble in producing an effervescence when brought together. No doubt, the student of acids might urge that acid is all-important in the result. One more interested in solids might maintain that the marble is responsible for the reaction, since without it there would be no effervescence. But every scientific man ought to recognize the futility of such a discussion. The truth is that the hereditary factors in the egg cannot show themselves excepting under a suitable environment. As every agriculturalist knows, he cannot get a particular crop, say of melons, with seed merely, no matter how good, if he does not have the appropriate soil and food in which to grow them. He would be a very stupid agriculturalist, however, who would think that there is a universally good environment for all plants, and would plant huckleberries and watermelons in the same soil. What would be

the best environment for one form would be the worst possible environment for the other. It is no more true that there is a universally good environment than that there is a universally good heredity. The truth of the matter is that individual humans, like individual dogs, have different constitutions. The child makes best progress when he gets not merely a general training, but that training which is specifically best for his specific constitution.

After this introduction, we may consider the genetic factors in intellectual and moral traits of children, or, in other words, the internal factors that control the development of such traits. That there are such factors is indicated by the circumstance that different races of mankind under all environments show a clear difference in intellectual and temperamental traits. All qualitative tests that have been applied to the intellectual traits of negro and white adolescents, brought up in public schools and speaking the same language, indicate difference in favor of the whites. In respect to tests on discrimination of the elements of music, there appears to be an inferiority, on the average, on the part of the white children. On the intellectual side, references to such racial distinctions may be had in the works of numerous authors.

Even in a white population, one finds differences in mental capacity in different families. A study was made upon families of children with a high IQ (intelligence quotient). It clearly appeared that these children belonged to families with unusual intelligence. Certain studies on genius demonstrate the same thing. One finds in the great majority of cases that such genius arises from families containing close relatives distinguished by success in the intellectual sphere. We hear very often of intellectual geniuses who have arisen from mediocre parentage. That unexpected developments do occur in the intellectual sphere of mankind, there is every reason to suppose, and such developments are, for anything we know to the contrary, as apt to occur as not in a germ plasm that has previously been characterized by inferior capacity for producing highly intelligent people. For all we know, Shakespeare and Lincoln, and the others cited, may have been intellectual "sports"; that is, they may have been very much higher intellectually than any of their forbears. On the other hand, in the case of Lincoln it must be re-

iterated that we know very little about his pedigree. We know about only one of his two grandfathers. As to Shakespeare's pedigree, we know that his father was one of the leading citizens of a considerable town, and his mother belonged to a family of some distinction. Goethe sprang from a group of highly intellectual persons. The studies of Galton long ago demonstrated that examples of genius rarely occur uniquely in a family. Two geniuses in a family, say of twenty individuals, are much more common than single sporadic cases in such a family. All of this indicates that a child born of parents both of whom belong to intellectually well-endowed families has a much greater chance of showing excellent intelligence than a child born of parents both of whom belong to families that have shown no intellectual capacity or achievement.

On the moral side, we have comparatively few studies showing the hereditary factors. Capacity for conducting oneself in accordance with the mores (rules and regulations of the times) depends, among other things, upon the temperament. In an examination of the distribution of temperament in some ninety families, it was found that its occurrence showed a system or law (which was elaborated in a work published by the Carnegie Institution). It appears that excessive activity (*hyperkinesis*) is typically inherited as a dominant trait, and when one of the parents is overactive, at least half of the children will show the same tendency. On the other hand, when both parents are depressed, the children tend to show the same depression. Thus we get families characterized by such deep depression that suicides frequently occur in them. Now, whereas the persons who are below normal in activity (*hypokinesis*) find it rather easy to act in accord with the mores, the hyperkinetics find it difficult to do so. They are often neurotic; are apt to express themselves excessively, both physically and vocally; and they get into trouble for physical or verbal assaults. The temperament, in turn, seems to be controlled by hormones (regulating bodies secreted by the ductless glands), though the exact source of such has not been located.

That social traits have an hereditary basis is indicated by the fact that even the several European races are not alike in their social traits. A study was made of a number of children belonging to different European groups in the schools of New York City. Independent judgment of one to three teachers was made on each 102 persons in respect to ten social traits; namely, leadership, pertinacity, humor, frankness, suspiciousness, sympathy, loyalty, generosity, obtrusiveness, and coolness. The German, Irish, Italian, and Jewish children ranked diversely in these traits. In not a few of the cases, the differences

in these judgments were so far beyond the probable errors as to make it reasonable to conclude that they indicated real racial differences.

Precise studies upon the hereditary factors in such traits, it must be admitted, have not been made. Nevertheless, we see clear evidence in the family recurrence of some of these traits that they have an hereditary basis and are probably significant. Thus, in the field of leadership, we have a remarkable family—the Walcott family—eight or more of whose members have been governors of Connecticut or Massachusetts. In inventiveness, combined with artistic capacity, we have such a family as that of the Herreshoffs or the Fairbanks family of Vermont. Capacity in vocal and written expression was characteristic of the Beecher family, in whom, for two or three generations, great preachers and writers appeared in extraordinary number. Generosity seems to be a family trait in some of our families of hereditary philanthropists, like that of the Dodge family. While it has been urged that imitativeness plays a considerable part in these family recurrences, yet that is an inadequate explanation, for no person can become a star performer in any field, no matter what instruction he receives, unless he has natural gifts, enabling him to play his part extraordinarily well. If there is one thing that modern experimental, quantitative testing of capacities in humans has shown, it is that people differ enormously in their native endowment in the spheres of the senses and temperaments, and it is clear that they differ in the sphere of the instincts and of self-control.

C.B.D.

**Related Subjects.** The reader is referred in these volumes to the following articles:

|   |                   |
|---|-------------------|
| Breeding                                    | Hybrid            |
| Cell  | Natural Selection |
| Evolution                                   | Protoplasm        |
| Zoölogy (How Zoölogy Affects Human Welfare) |                   |

**HEREFORD**, *hehr' e ford*, CATTLE. See illustration, in article AGRICULTURAL EDUCATION; also, CATTLE.

**HERESY**, *hehr' e sie*, an opinion or doctrine of a member of any Church which is contrary to the established creed of that Church. The person whose ideas differ from the accepted belief is called a *heretic*. Heresy, which by many churches was considered a wrong and exceedingly pernicious belief, was punished by death until religious freedom had obtained full sway among the nations. From the thirteenth to the sixteenth centuries, heretics were persecuted in Spain, Italy, and France, while in England many were burned at the stake. Such reformers as Wycliffe, Huss, and Luther were considered as heretics by the Roman Catholic Church. In modern times, religious freedom is so extensive that in practi-

cally all countries a man is permitted to hold any belief that appeals to him as right. G.W.M.

**Related Subjects.** The reader is referred in these volumes to the following articles:

|                           |                                  |
|---------------------------|----------------------------------|
| Huss, John<br>Inquisition | Luther, Martin<br>Wycliffe, John |
|---------------------------|----------------------------------|

**HERGESHEIMER**, *hur' ges hi mur*, JOSEPH (1880- ), an American novelist whose early efforts were encouraged by the editor of the *Saturday Evening Post*, the publication in which his first stories appeared. He was born in Philadelphia and in his youth wished to become a painter, but turned, instead, to literature, and was very successful. In his stories he exhibits a pronounced talent for colorful and spirited writing.

**Representative Books.** Hergesheimer's first work of importance was *The Lady Anthony*. This was followed by *Mountain Blood*, *The Bright Shawl*, *The Happy End*, *Gold and Iron*, *Linda Condon*, *Java Head*, *Cytherea*, *Tampico*, *Swords and Roses*, and *Tampico*. Scores of short magazine stories have come from his pen. Several of his novels have been successfully adapted for the moving-picture screen.

**HERJULFSON, BJARNI**, *hehr' yulf son, bahr' ne*. See VINLAND.

**HERMES**, *hur' mee*, the Greek god whom the Romans called Mercury (which see).

**HERMIONE**, *hur mi' o ne*, daughter of Menelaus, king of Sparta, and the beautiful Helen. She was claimed as a bride by Pyrrhus, son of Achilles, according to Greek mythology. In one legend, Pyrrhus kidnaps Hermione and she is rescued by Orestes, son of Agamemnon, to whom she is betrothed. Racine, in *Andromaque*, represents Hermione and Pyrrhus at the marriage altar, when Orestes kills the son of Achilles. A modern version of the wooing of Hermione is the amusing account in John Erskine's *Private Life of Helen of Troy*.

**HERMITAGE, THE**, the home of Andrew Jackson (which see).

**HERMIT CRAB**, a crab which has the peculiar habit of occupying the shells of various mollusks. It uses spiral shells cast off by their original owners, or sometimes drags out the occupant of a desirable shell and devours the victim in order to obtain its home. Unlike other crabs, the hermit crab has a soft-shelled, unprotected abdomen which takes the form of the spiral shell occupied. As the crab increases in size, it changes to a larger shell.



HERMIT CRAB  
In its borrowed shell.

So firmly does the hermit attach itself to its home, by means of a strong hook at the end of the body, that it is impossible to draw it out without tearing the body. The habit of living alone in its shell house no doubt suggested its name. See CRAB. S.H.S.

**Scientific Names.** Hermit crabs belong to the family *Paguridae*. A species only an inch in length, *Eupagurus longicarpus*, occurs on the Atlantic coast between Massachusetts and South Carolina. *E. bernhardus* is found in Europe and on the northeast coast of North America. Some of the numerous species are land crabs (see LAND CRAB).

**HERMITS**, persons who withdraw from society and live alone, usually for religious contemplation and with a view to avoiding the temptations and cares of the world. The early centuries, notably the third, witnessed a great development of this practice. The first hermit is said to have been Paul of Thebes, who fled to the Egyptian desert, where he lived for ninety years. This solitary life also began among the Christians in the period of persecution. Communities were formed through the influence of Saint Anthony, who is known as the father of homes for the monks, where each member had a solitary dwelling, but all came together for worship. These communities finally grew into monasteries, or convents, and the number of hermits became gradually fewer. The solitary penitent, or devotee, is a feature of many religions, both ancient and modern.

Considered apart from religion, there are few people in civilized countries who can be called hermits. Occasionally, there is known to be a person who withdraws from association with other men and lives alone, but he has no object other than seclusion.

**HERMIT TRAIL.** See GRAND CANYON.

**HERMON, MOUNT.** See PALESTINE (The Land); LEBANON, MOUNTAINS OF.

**HERMOPOLIS**, *hur mop' o lis*. See CYCLADES.

**HERNE, JAMES A.** (1840-1901), whose real name was JAMES AHERNE, was an American actor and dramatist. He was born in Troy, N. Y., and after a brief experience as an actor, while yet a young man, he appeared in his native city in *Uncle Tom's Cabin*. The most successful plays in which he starred were *Hearts of Oak* and *Shore Acres*, both of which were written by himself; they were quaint rural comedies, skilfully portraying types of everyday life.



Photo: Brown Bros.  
JAMES A. HERNE

**Other Plays.** These include *Drifting Apart*, *The Minute Men*, and *Sag Harbor*, a New England coast comedy.

**HERNIA.** When the wall of the abdomen becomes weakened or, through a sudden strain, becomes ruptured, the condition is called *hernia*. This consists of a protrusion of the intestines through a false opening in the abdominal walls. The term properly means *tumor*, and signifies the protrusion of any organ of the body through an accidental opening. A hernial sac may contain omentum, fat, or other structures in place of intestine, or in addition to the loop of bowel.

The danger of hernia, using the common meaning of the word, is in the shutting off or choking of the knuckle of the protruding intestine. This is called *strangulation*, and calls for immediate operation or the patient will die. A person who develops abdominal hernia should wear a truss or other support to keep the intestine inside the abdominal cavity; or there should be an operation to close the false opening, which constantly tends to become larger the longer it is neglected. W.A.E.

**HERNICANS.** See LATIUM.

**HERO**, in mythology, the beautiful priestess who placed a bright light at the top of her lonely tower each night, to guide her lover, Leander, as he swam across the Hellespont to see her [see DARDANELLES (In Myth and Story); HELLESPONT]. No one suspected their meetings, and all went well until the first severe storms of winter swept over the sea. Then one morning, after watching all night in the storm, Hero found the body of her lover tossing on the waves at the foot of her tower. In despair she threw herself into the sea and perished at his side. Lord Byron, the English poet, attempted with success Leander's feat of swimming across the Hellespont, and upon his return from the adventure wrote thus of the ancient lovers:

His eye but saw that light of love,  
The only star it hail'd above;  
His ear but rang with Hero's song,  
"Ye waves, divide not lovers long."

**HEROD, hehr' ud**, the family name of a group of remarkable rulers whose members occupied prominent governmental positions in various provinces of Palestine about the time of Christ. The first and most famous was Herod the Great, the son of an Idumacan father and mother; the family was not Jewish, although the Herods had been compelled to adopt the Jewish religion by their conquerors in 125 B.C.

**Herod the Great** (74-4 B.C.), the wicked king of Judea, was often called the "murderer of the innocents," because at the birth of Christ, in the latter part of his reign, he caused all male children under two years of age to be slain (*Matthew* ii, 16). This was done for the reason that Christ had been pro-

claimed the future king of the Jews; Herod, upon being unable to find him, caused all to be killed, that he might not miss putting this one out of the way, so he could not later appear and seize the throne.

Herod was the second son of Antipater, whom Caesar made governor of Judea, and in 46 B.C. he became ruler of Galilee. Seven years later, after the assassination of his father, he was appointed king by the Roman Senate, but it was not until 37 B.C. that he succeeded in putting down the forces opposing him, by capturing Jerusalem. After putting to death many of the opposite party, he set up a magnificent empire. He had ten wives, and much of his life was spent in putting down plots of his various sons to obtain possession of the throne. All Judea rejoiced at his death.

**Herod Antipas** (? -A.D. 39), the crafty tetrarch of Galilee who beheaded John the Baptist (which see), although his wife, Herodias, was the prime mover in the act. He was the son of Herod the Great by a Samaritan wife Malthace, but at his father's death, in 4 B.C., the kingdom was given to his brother Archelaus, so in Galilee he made Sepphoris his capital, rebuilding most of the city. After marrying a daughter of Aretas, king of the Arabs, he divorced her to marry Herodias, the wife of his half-brother, Herod Philip. This brought on a war with Aretas, in which Antipas was routed, for he lacked his father's ability in war and also his diplomacy. Herodias made a tool of him; urged by her, he went to Rome and demanded of Caligula that he be made king, as had Agrippa I. Instead, he was confronted by false charges from Agrippa himself and banished to Lyons in Gaul, in A.D. 39, where he soon died. He is the Herod most frequently mentioned in the Bible, for it was to him that Pilate sent Jesus just before the crucifixion (*Luke* xxiii, 7).

**Herod Agrippa I** (10 B.C.-A.D. 44), an ambitious king of Judea, who obtained control of the entire territory over which his grandfather, Herod the Great, had ruled. He caused the death of Saint James (*Acts* xii, 2), and had Saint Peter imprisoned. As the son of Aristobulus, he was educated at Rome with Drusus, the son of Emperor Tiberius, where he cultivated very luxurious tastes. For rash words spoken in favor of Caligula, he was imprisoned by Tiberius, but six months later, on the accession of Caligula to the throne, he was given the provinces which had belonged to Philip and Lysanias. When Herod Antipas was banished, Galilee was included in Agrippa's territory, and in A.D. 41, Claudius, who had just become emperor, added Judea and Samaria to his kingdom, which then equaled that of Herod the Great. His sudden death is described in *Acts* xii, 20-23.

**Herod Agrippa II** (A.D. 27-100), the king over the provinces of Philip, Lysanias, and Varus, before whom Paul was brought by Festus (see article on each), where he entirely cleared himself of charges on the eve of being taken to Rome (*Acts* xxv, 12; xxvi, 32). At the death of the father, Agrippa I, Claudius, who was then emperor, was persuaded not to give the kingdom to the son Agrippa II on account of his extreme youth, for he was only seventeen; so all of Palestine passed under direct Roman rule, with a procurator (governor) placed over each of the provinces. In A.D. 50 he was made king of Chalcis, at the death of an uncle who had ruled the territory, but later he surrendered it for the provinces which he afterward ruled. He possessed the family passion for

building gorgeous cities, but was unlike his father, who was much interested in the Jews and their welfare. When the troubles began which ended in the Jewish war against Rome, Agrippa II tried to prevent the Jews from making armed resistance, but as it was useless, he remained loyal to the emperor by fighting with Vespasian. Later he was made praetor.

**HERODIAS**, *he ro' dih as*. See HEROD (Antipas); JOHN THE BAPTIST.

**HERODOTUS**, *he rod' o tus* (about 484-about 424 B.C.), a Greek historian of antiquity, the first writer of historic narrative which was artistic and unified. He therefore deserves the title, "Father of History," conferred upon him by Cicero. He was born at Halicarnassus, a famous city of Asia Minor. During the early years of his manhood, he traveled far and wide, visiting the shores of the Hellespont and of the Euxine, Scythia, Syria, Palestine, Babylon, Egypt, and the Greek colonies on the northern coast of Africa. Everywhere he

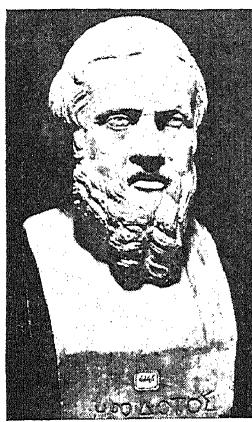


Photo: Visual Education Service

HERODOTUS

From a bust in the National Museum, Naples.

studied the manners, customs, and religion of the people, the history of the country, and the productions of the soil, and his imperishable *History* is based on what he saw and what he was told in these travels. About 447 B.C. he visited Athens, then at the height of its intellectual glory, and three years later joined the colony which was being founded by Pericles in Southern Italy. Of the rest of his life nothing is known, but, according to tradition, he died and was buried at Thurii.

The great historical work on



NESTS OF HERONS

The herons build their nests in the village manner. This picture was photographed in Minnesota's northern woods.

which the fame of Herodotus rests consists of nine books. In these he tells the story of the rise of the free states of Greece and their struggle with the invading hosts of the kings of Persia. His pages are alive with human interest and brightened with innumerable stories and anecdotes, not all of which he himself believed, however. His simple, unaffected style has been the delight of critics from his own time down to the present.

**HEROIC AGE**. See AGE (Historic Ages).

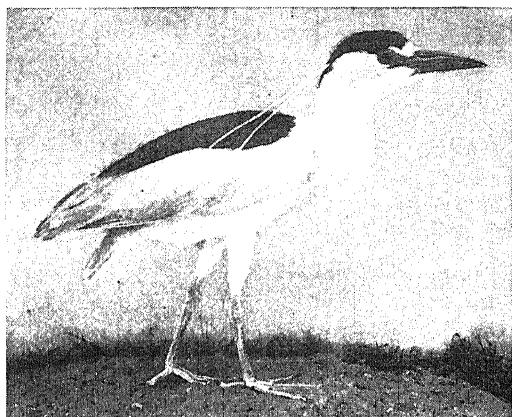
**HEROIC VERSE**. See DRYDEN, JOHN.

**HEROIN**, *hehr' in*, or *hehr' o in*, a drug whose action is similar to that of morphine, but which does not produce the narcotic effects of the latter. Heroin is an artificial product derived from morphine, and has been in medical use since 1898. It is now employed chiefly to relieve coughing. It must never be taken except in the doses prescribed by a reliable physician, for it is one of the most vicious of habit-forming drugs. See MORPHINE.

**HERO ISLANDS**. See VERMONT (The Land).

**HERON**, *hehr' un*, the name of a family of wading birds which includes the herons proper and the bitterns (see BITTERN). This article describes only the former. One species, the *blue heron*, is pictured on the screens, fans, and pottery of Japanese artists. Certain species with ornamental tufts of feathers are called egrets, and are known principally through the greed of plume-hunters, for they are today practically extinct in many of their former haunts (see EGRET). The characteristics of all are the same, the chief differences being in size and plumage.

**Characteristics of Herons.** These graceful birds are easily distinguished by their long, sharply pointed bills, which seem to extend into the eyes; by narrow heads and long, slender necks, and by their naked, stork-like legs. Their four toes are on the same level, three in front and one behind. The tails are



Photos: Visual Education Service



#### SOME OF THE HERONS

Above, at left, the black-crowned night heron; at right, snowy egret; below, the great blue heron. See, also, illustration in article EGRET.

eggs are laid, which hatch into helpless, scrawny little birds that must be fed for two or three weeks before they are able to fly and shift for themselves.

Silent and alone, the heron stalks along the shores of streams with stately stride, looking for things to eat; or, hour after hour, with head drawn between the shoulders, statue-like and apparently asleep, it stands, patiently watching for fish, frogs, or small reptiles. Once seen, however, its prey is caught with a lightning dart of graceful neck and spearlike bill. The heron's only cry is a hollow squawk which Longfellow mentions in *Hiawatha* as "a cry of lamentation."

**American Herons.** The largest American species are the *great blue heron* and the *great white heron*. The former, a bird about four feet high, is a summer resident throughout the United States and Canada. It is often incorrectly called a *crane*. A colony of this slate-gray species nested near the home of Lowell, and Longfellow wrote about the birds in *The Herons of Elmwood*. The great white heron (sometimes confused with the American egret) is found on the coasts of Southern Florida and southward. It is slightly taller than the blue heron, and has a wing spread of eight feet. The most abundant heron in New England and New York, as well as the smallest of American herons, is the sixteen- to eighteen-inch *little green heron*. It is found

short, rounded, and compressed. Herons are able to strike heavy blows with their powerful necks and strong beaks. Many species have long, ornamental crests and handsome plumes on throat and body, especially during breeding time. All have three pairs of peculiar feathers called "powder-down tracts," whose purpose is not yet known. One pair of these is on the breast, one on the rump, and one under the thighs.

In flight, herons are not so handsome as on land, for they stretch their long legs straight out behind them and, unlike the cranes, curl their heads between their shoulders. But at a distance their flight seems majestic, and is quite as impressive as that of an eagle. Herons usually nest and roost in flocks, but have solitary feeding habits. Their nesting places are called *heronries*. The nests are loose, crude masses of sticks, built in tree tops or in bushes near the place of feeding. From three to six

from tropical America far into Canada, and is known by boys as *shitepoke*, or *fly-up-the-creek*. It is a solitary bird, and is never found in flocks. The *black-crowned night heron* is more fully described under NIGHT HERON. D.L.

**Scientific Names.** The heron family is known as *Ardeidae*. The great blue heron is *Ardea herodias*; the great white, *A. occidentalis*; the little green, *A. virescens*.

**HERO OF ALEXANDRIA.** See FIRE DEPARTMENT; STEAM ENGINE.

**HEROULT PROCESS.** See ALUMINUM.

**HERPES**, *hur' pez*, a name given to several skin diseases, but particularly to *herpes zoster*, commonly called *shingles*. *Herpes*, from the Greek word meaning *I creep*, indicates the nature of the ailment. An infected nerve root sets up an inflammation of the skin, which creeps along the course of the affected nerve, being marked by patches of pimples. These often form blisters, which eventually break and become covered with scabs. The areas are extremely tender to the touch, and the disease is characterized by severe neuralgic pains. Almost any part of the body may be affected, but the trunk is a common location, especially the waist. Herpes in this area girdles half of the waist, from the middle of the abdomen to the backbone.

Physicians treat the ailment by applying soothing and antiseptic ointments, and by giving sedatives to quiet the pain. Some physicians recommend the injection of blood into a vein near the afflicted part. The acute stage of herpes lasts from ten days to two weeks, but the eruption may not wholly disappear for a month or more, and the affected nerve may cause pain for several weeks. However, the disease rarely reoccurs. The patient must rest and take good general care of himself, for a long time after an attack.

**HERRERA**, *air ra' rah*, FRANCISCO DE, the name of two distinguished Spanish painters, father and son, who were born in Seville.

Francisco de Herrera (1576-1656), the Elder, is regarded as the originator of a new style of painting which reached perfection in the work of Velasquez, his pupil. Vigor and a free naturalistic spirit were its chief characteristics. Herrera painted historical and religious scenes, and worked both in oil and al fresco (see FRESCO). His *Last Judgment*, in San Bernardo Church, Seville, is a masterpiece of design and coloring. He was also a skilful worker in bronze.

Francisco de Herrera (1622-1685), the Younger, became celebrated for his pictures of fruit, flowers, and fish, especially the latter. He was associated with Murillo in the establishment of the academy at Seville, and was court painter to Philip II. As a preparation for fresco painting, he had studied architecture and perspective, and served as master of the royal buildings under Charles II. He had some of his father's spirit, but not his skill. Of his larger works, the most notable are *The Ascension*, now in the Atocha Church in Madrid, and *San Francisco*, in the Seville Cathedral.

**HERRICK, ROBERT** (1591-1674), an English poet, born in London and educated at Cambridge. In 1629 he accepted the vicarship of Dean Prior, Devonshire, but he espoused the cause of the king, Charles I, and opposed the growing Puritan power, so his royalist principles lost him his post in 1647. He then went to London, where he published *Hesperides* and *Noble Numbers*. In 1662, after the Restoration, he was reinstated in his old living, where he remained until his death.

**As a Poet.** Herrick's verses are distinguished by their exquisite sentiment, fine poetic quality, and descriptive beauty. For a considerable period following his death, they suffered an undeserved neglect, but beginning with the nineteenth century there came a merited revival.

Among his most popular poems are *Corinna's Maying*, *Cherry Ripe*, and *Gather Ye Rosebuds While Ye May*.

**HERRICK, ROBERT WELCH** (1868- ), an American novelist whose realistic, and sometimes over-frank, method of depicting life has roused great interest and some criticism. Whether he deals with the struggle of woman for freedom, the conflict between a man's ideals and his lust for success, or the problem of the modern American marriage, he shows an admirable literary sense and power of character analysis. Herrick was born at Cambridge, Mass., studied at Harvard University, and since 1893 has been professor of rhetoric and English literature at the University of Chicago.

**His Writings.** His numerous novels include *The Gospel of Freedom*, *The Common Lot*, *Together*, *The Healer*, *Clark's Field*, *The Conscript Mother*, *Homely Lilla*, and *Waste*; among his shorter stories, *The Master of the Inn* has a peculiar, fresh charm. *The Common Lot*, a study of the struggles of an architect between aristocratic ideals and desire for money, and *Together*, a frank discussion of war and marriage, are accounted his strongest books.

**HERRING**, a food fish which is considered the most important in the world, although it is not so extensively used in America as in Europe. It belongs to the herring family, which includes, also, the shad, menhaden, sardine, and alewife. The name is from the German *heer*, meaning *army*, referring to the immense shoals of many millions of individual fish. Common herring are numerous along the coasts in the temperate and colder parts of the North Atlantic Ocean, and vast numbers



Photo: Brown Bros.

ROBERT HERRICK

are taken from the North Sea, but various other species are found in the Pacific Ocean as well.

**Herring Characteristics.** The average length of herring is twelve inches. They are well-formed fish, with thin scales, blue-green above and of a brilliant silvery-white below. Both jaws have very small teeth. Their principal food consists of small shellfish, such as shrimps and copepods, or *red seeds*. Millions of herring swim close together near the surface of the water, in areas of from six to twenty square miles. According to species and temperature of water, herring spend part of the time in deep waters, then migrate to shallower waters of coasts. It is near the coasts that the eggs are laid, because they need oxygen, heat, and sunlight in order to hatch and develop. From 10,000 to 40,000 eggs are laid yearly by each female. Settling to the bottom of the water, they cover seaweed and rocks for miles. Within a few weeks the eggs hatch. There are numerous herring enemies, however, and in spite of the prolific habits of these fish, their number is greatly reduced by crabs and fish which eat the eggs and young. The adult herring are captured not only by other creatures of the sea, such as the whale, porpoise, seal, cod, haddock, etc., but by eagles, cormorants, gulls, and many other birds.

**The Herring Industry.** It is when vast numbers of birds are seen hovering over the shallow waters that fishermen know that schools of herring have come to lay their eggs. When

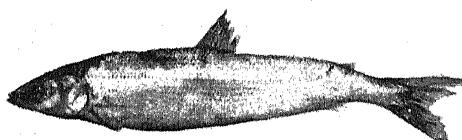


Photo: Visual Education Service

#### APPEARANCE OF THE HERRING

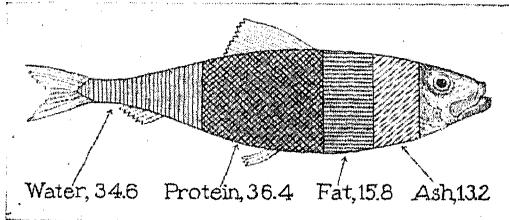
those welcome signs appear, the fishermen go forth to make their yearly hauls, for the herring is best-flavored at spawning time. The herring-fishing industry is attended with danger, especially in the North Sea, which is noted for its destructive gales. But the fishermen of the surrounding countries, England, France, Sweden, and Norway, are brave and sturdy, and each year they risk their lives and suffer hardships in this calling.

The principal method of catching herring is by means of large, clumsy sail or power boats called *luggers*. Fishermen go out to a spot where a large number of herring are seen, and an immense seine is let out from the boat to surround the shoal. The crew then row along the edges of the seine in small boats, and force the mass of fish nearer the lugger. Then, when

as many herring as possible have been surrounded, the lugger approaches, and hundreds of thousands of the shining creatures are raised in the large net and thrown into the boat.

Gill nets are also used in herring fisheries, and also fish-traps called *weirs*. In some places, the old method of going out at night, luring the fish to the boat by means of a lighted torch, then dipping them up, is still in use.

The world's annual catch of herring is estimated to be over ten billion individual fish. Norway leads all other countries in the



#### COMPOSITION OF SMOKED HERRING

The fuel value of this fish is 1,305 calories per pound—about equal to that of porterhouse steak and one-half more valuable than that of veal.

industry. The most important American fishing grounds are between Cape Cod and the Bay of Fundy.

**Uses of Herring.** Many herring are frozen and used for bait in cod fisheries. Millions are made into fertilizer, and the oil extracted is used for machinery and other purposes. Others are pickled or smoked and sold as food fish. Large quantities are eaten fresh. Herring which have been smoked but not salted are known in England as *Yarmouth bloaters*. Those similarly prepared, but also split and cleaned, are called *kippered herring*. They are put in tins in Scotland and Norway and sent to America, where they are regarded as the most appetizing form of herring. Small herring are often put into tins and sold as *sardines*, and in London they are sold as *white-bait*, a celebrated dainty dish. Pickled herring, that is, those which are put into brine, sometimes with onions and spices, are sold either *round* or *split*. The former are salted whole; in the latter, the gills, heart, and other parts have been removed. See FISH (Deep-Sea Fisheries).

L.H.

**Scientific Name.** The common herring is known as *Clupea harengus*.

**HERSCHEL**, *hur' shel*, the family name of three famous English astronomers.

Sir William Herschel (1738-1822) was the first to convey to the human mind any conception of the immensity of the heavens. While observing what he supposed to be a comet, he discovered a new planet; this distinction won him the position of private astronomer to George III, by whom he was later knighted. He discovered Uranus and what he took

for its six satellites, and also located two satellites of Saturn; he detected the rotation of Saturn's ring, the period of rotation of Saturn itself, and that of Venus. His catalog of double stars, nebulae, etc., his tables of the comparative brightness of stars, and his researches in regard to light and heat place him among the foremost of modern astronomers and natural philosophers. See URANUS; URANIUM.

**Caroline Lucretia Herschel** (1750-1848), like her illustrious brother William, was born in Hanover, Germany, but early followed him to England, where she acted as his capable assistant, sharing his labors and his distinctions. With a small Newtonian telescope, made for her by her brother, she made many independent observations in regard to comets, of which she discovered eight. She also discovered several nebulae and clusters of stars.

**Sir John Frederick William Herschel** (1792-1871), son of William Herschel, at first interested himself in reexamining the nebulae and clusters of stars described in his father's catalogs, and he added many similar bodies to his own list. His father had explored the northern heavens; he determined to explore the heavens of the south, as well as reexplore the north. This constituted his important life work, for at the Cape of Good Hope he made a complete telescopic survey of the heavens, his observations covering a period of four years. For this contribution to astronomical research, he was made a baronet by Queen Victoria and honored by Oxford University. He was also distinguished as a chemist, and attained important results in photography. His literary bent is discerned in his translations from Schiller and from the *Iliad*. He was buried in Westminster Abbey, near Sir Isaac Newton.



Photo: Brown Bros.

WILLIAM HERSCHEL

**HERSCHEL ISLAND.** See ROYAL CANADIAN MOUNTED POLICE.

**HERTZ, hehrts, HEINRICH.** See ELECTROMAGNETIC THEORY OF LIGHT.

**HERZEGOVINA, hehr tse go ve' nah.** See YUGOSLAVIA; BOSNIA AND HERZEGOVINA.

**HERZEN, hehrt' sen, ALEXANDER.** See RUSSIAN LITERATURE.

**HERZL, hehrts'l, THEODOR** (1860-1904), the founder of the Zionist, or "back to Palestine," movement, was born in Budapest. Because he saw that European Jews failed to gain a social status even when politically free, Herzl conceived the idea of gathering the scattered Jews into a country and a nation of their own. He was actuated by economic motives, rather than by racial or religious ideas, and his position attracted a few great men, such as Max Nordau and Israel Zangwill. In 1897 Herzl presided over the first Zionist congress, held

at Basel, Switzerland. The British government offered him a tract of land in British East Africa, in 1901, but the controversy that arose as the result of this offer brought about his death. Since his death, considerable progress has been made by the Zionists in colonial developments in Palestine. See ZIONIST MOVEMENT.

**HESIOD, he' se od.** In ancient Greece, at the very beginning of history, lived the first European poets whose work has survived. They were the "mighty Homer," whose epics are immortal, and the shadowy figure of Hesiod, who was the father of that type of verse which seeks to instruct or give information, and is therefore called *didactic poetry* (which see).

All that is known of Hesiod's life—and that knowledge is often disputed—is that he probably lived during the eighth century B.C., that he was born near Mount Helicon, at Ascra, and that he tended his father's sheep on the slopes of the mountain. Later, he became a wandering poet, and met his death, tradition says, at the hands of an assassin, at Oeneon, in Locris.

Hesiod's earliest poem is the only one of his works which authorities agree upon as genuine; it is the famous *Works and Days*, a collection of fables, personal experiences of the poet's life and work, personal and agricultural advice, and a religious calendar. The following indicate the nature of his advisory remarks:

Work is no disgrace; but idleness is a disgrace.  
Emulation is good for mankind.

**Other Books.** While there is some doubt that the following were the work of the same man who wrote *Works and Days*, these are generally credited to him: *The Theogony*, interesting because it attempts to organize the Grecian legends of the gods and goddesses into a system, and *The Shield of Heracles*.

**HESIONE, he si' o ne.** See PRIAM.

**HESPERIA, hes pe' re ah,** a daughter of Hesperis. See HESPERIDES.

**HESPERIDES, hes pehr' ih deez,** in Greek legend, Agle, Arethusa, Erytheia, and Hesperis, the daughters of Atlas and Hesperis, who guarded the golden apples which Gaea, or Earth, presented to Juno on her marriage to Jupiter. The sleepless dragon, Ladon, assisted the maidens in their guardianship of the sacred fruit. It was the eleventh labor of Hercules to obtain the golden apples. See HERCULES (The Twelve Labors).

**In Literature.** The Hesperides are frequently referred to in the classics; an example is found in Shakespeare's *Pericles*:

Before thee stands this fair Hesperides

With golden fruit, but dangerous to be touched;  
and Whittier in his *Barefoot Boy* gloats over his boyhood memory in the words:

Mine, on bending orchard trees,  
Apples of Hesperides!

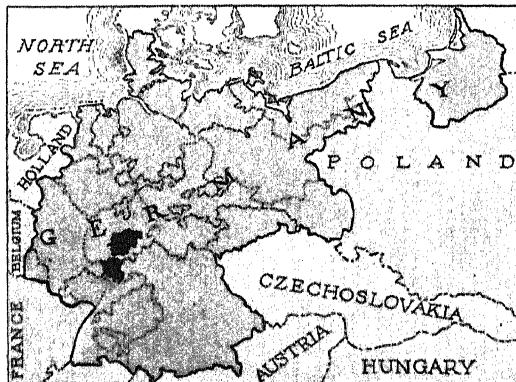
**HESPERIINA**, *hes pehr ih e' nah*. See BUTTERFLY (Classification).

**HESPERUS**. See EVENING STAR; VENUS.

**HESSE**, *hes*, since 1919 a republic, a part of the new German republic. Formerly, it was a grand duchy of the German Empire. It is divided into two main portions: a northern division, consisting of the province of Oberhessen (Upper Hesse), and a southern, formed by the provinces of Starkenburg and Rheinhessen (Rhenish Hesse). Oberhessen occupies the territory between the basins of the Weser and the Rhine rivers; Starkenburg lies between the Main and the Rhine, and the latter river separates Rheinhessen from Starkenburg. The total area

of Hesse is 2,965 square miles, which is a little in excess of the area of Delaware; the total population, 1,347,279 (1925), was more than five times that of Delaware at that date.

The people are engaged chiefly in agriculture and mining. More than three-fifths of the available land is cultivated; large acreages are planted to grapes and to sugar beets. Among the grain crops, rye and barley take the leading place. Iron, manganese, salt, and coal con-



LOCATION OF HESSE

stitute the mineral wealth of Hesse. The principal towns are Darmstadt, the capital, Offenbach, Mainz, Worms, and Gissen.

[For a detailed description of Darmstadt, Mainz, and Worms, see GERMANY (Principal Cities).]

The name of this former duchy has figured in European history since the beginning of the Christian Era, and has been applied to a country of varying boundaries. It was known as Hesse-Darmstadt until the time of the Seven Weeks' War (1866) between Austria and Prussia, when it was reduced to its present limits; in 1871 it was incorporated into the German

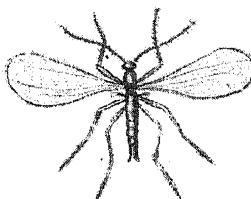
Empire, and in 1919 into the republic at that time established. See GERMANY (History).

**HESSIAN**, *hesh' an*, **FLY**, a tiny two-winged insect, the maggots (larvae) of which are the most destructive of the pests that attack wheat crops. There have been years when the Hessian fly has caused a loss amounting to ten per cent of the combined wheat crop of the United States and Canada—over 100,000,000 bushels. From this amount of grain, enough bread could be made to feed several cities the size of Chicago for a year. In addition to ravaging wheat, the insects breed in barley and rye. They are especially destructive to the winter-wheat crops.

#### Description and Life History.

The Hessian fly received its name from an unfounded belief that it was introduced into America in the bedding-straw of Hessian troops employed to fight against the Americans during the War of Independence (see HESSIANS; REVOLUTIONARY WAR IN AMERICA). The parent fly is about an eighth of an inch long, with a wing expanse of about a quarter of an inch. With its dark-brown body and dusky-gray wings, it looks very much like a mosquito. There are two principal broods annually. The eggs for one are laid during April or May, and for the other during September. Each female lays from 150 to 300 tiny pale-red eggs. They are deposited in rows of three or more on the upper part of the leaf, or on the lower joints of the wheat stalk. In about five days, whitish maggots hatch from the eggs and embed themselves between the leaf-sheath and stem of the grain. They then commence to suck the juices from the stem, and their presence can be told by an enlargement of the plant at those points (see GALLS). Within a few weeks, the young change into small brown objects which look like flaxseed. They remain in that state until they are ready to emerge as full-fledged flies. The eggs laid in the spring develop into the adult flies of September; those laid in the fall produce the full-grown flies of April and May.

**Control.** It is impossible entirely to save a crop which has become badly infested with Hessian flies. Plentiful and prompt use of fertilizers will cause the wheat to send out new shoots, and so a better yield will be obtained. By planting winter wheat late enough not to be attacked by the fly, and early enough not to be affected by weather conditions, the crop is practically assured. The exact date of planting will vary with the locality from about September 15 to October 15. Planting a small strip of wheat early enough in spring for the flies to lay their eggs in it, then plowing it



HESSIAN FLY

under, will insure the safety of the actual crop planted later. Fly-infested fields should be thoroughly disked after the harvest, so that the "flaxseeds" may be exposed to birds and other insect-eating creatures.

W.J.S.

**Classification.** The Hessian fly is a true fly of the order *Diptera* (see *DIPTERA*; *GNAT*). Its scientific name is *Cecidomyia destructor*.

**HESSIANS**, the name given to the German soldiers who were hired by the British to fight against the American colonies during the Revolutionary War (which see). As more than half of them came from two Hessian provinces, the term was applied to the whole body of mercenaries, about 29,800, who had been sold into a war in which they had no interest. The men who were thus shipped to America were victims of a system which allowed European princes to sell their subjects into military service. The men were paid the usual soldier's wages, about twenty-five cents a day, the princes meanwhile pocketing a substantial bonus from the British government. Many of the Hessians settled in America after the war and became industrious and loyal citizens. See *ARMY*.

**HESSITE**, *hes' ite*. See *SILVER* (*Sources*).

**HETCH HETCHY**, *hech hech' ic*, **PROJECT**. See *AQUEDUCT*, subhead.

**HETEROPTERA**, *het ur op' tur ah*. See *HEMIPTERA*.

**HETH**. See *HITTITES*.

**HEVEA**, *he' ve ah*. See *ECUADOR* (*Physical Features*); *RUBBER AND RUBBER MANUFACTURE*.

**HEVESY**, *heh' veh she*, G. von, one of the discoverers of hafnium (which see).

**HEWITT**, ABRAM STEVENS (1822-1903), an American manufacturer and politician, through whose generosity Cooper Institute in New York City is largely maintained, was born at Haverstraw, N. Y. In 1842 he was graduated with honor at Columbia College, New York City, and a year later began the study of law. On account of failing eyesight, he gave up the profession and engaged in the manufacture of iron with Edward Cooper, a classmate, and son of Peter Cooper, the founder of Cooper Institute. The maintenance of the Institute for many years was largely due to his efforts as trustee and secretary.

Hewitt introduced the open-hearth process of making steel in America (see *IRON AND STEEL*). In 1847 he was nominated for Congress by Tammany Hall (which see); was elected, and continued in the office until 1886, with the exception of one term. He was elected mayor of New York in 1886, after a campaign in which Henry George and Theodore Roosevelt were defeated. After his retirement from office he gave attention to private business affairs, but kept closely identified with municipal

movements and reforms. In 1901 he was elected chairman of the trustees at the organization of the Carnegie Institution. See *COOPER, PETER*.

**HEWLETT**, MAURICE HENRY (1861-1923), an English novelist, born in London, who achieved fame by his brilliant and faithful interpretations of the historical strife and romance of the Middle Ages. He was educated at London International College, and was admitted to the bar in 1891. Even after he became known as a writer, he held legal positions for a number of years.

**His Writings.** Besides *Forest Lovers*, Hewlett's first popular success, his novels on medieval themes include *Richard Yea-and-Nay*, *New Canterbury Tales*, *Little Novels of Italy*, *Pan and the Young Shepherd*, *Fond Adventures*, and *The Queen's Quair*. Among his novels of modern life, which reveal their author's socialistic views, are *The Halfway House*, *Open Country*, and *Rest Harrow*. Other works include *The Outlaw*, *Mainwaring*, several volumes of poems, and *Last Essays*, the last-named published after his death.

**HEXAGONAL**, *hek sag' o nal*, **SYSTEM**. See *CRYSTALLIZATION*.

**HEXAMETER**, *hek sam' e tur*. See *METER*.

**HEXAPODA**, *hek sap' o dah*. See *INSECT* (*What Is an Insect?*).

**HEXATEUCH**, *hek' sa tuke*. See *PENTATEUCH*.

**HEYSE**, *hi' ze*, PAUL JOHANN (1830-1914), a German novelist, dramatist, and poet. He was acknowledged a master of the novelette, of which he published more than a score of collections under various titles. The best known of these is *L'Arrabbiata*, counted among the most perfect short stories ever written. His poetic works include narrative poems, among which is *Urica*; and epics, the most notable of which are *The Bride of Cyprus* and *Thekla*. He wrote many dramas as well as novels, but they were less successful.

His novels, *The Children of the World*, *In Paradise*, and *Merlin*, although somewhat pessimistic, met with generous recognition. Heyse was awarded the Nobel prize in literature in 1910 (see *NOBEL PRIZES*).

**HEZEKIAH** (752-698 B.C.), the good king of Judah who began his reign, at the age of twenty-five, by suppressing all idolatrous worship which had existed under the rule of his wicked father Ahaz. After celebrating the



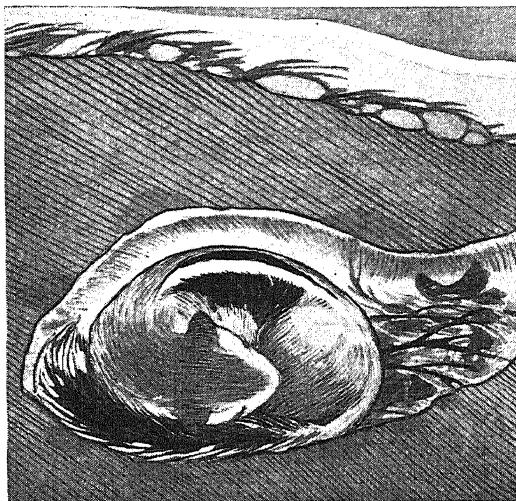
Photo: Brown Bros.

HEYSE



Photo: U & U

**Hiawatha and Minnehaha.** A statue erected at Minnehaha Falls, Minneapolis. The figures are life-size, and represent the Indian youth carrying the maiden across the water basin. (See article **HIAWATHA**, page 3172.)



WINTER HOME OF THE CHIPMUNK

He does not stay underground all of the time in winter; on pleasant days he comes out to enjoy the sunshine, but very soon goes back to the warm retreat he has made for himself. See HIBERNATION, below.

feast of the Passover, to which he invited the ten tribes of Israel, he gained a victory over the Philistines and became great and prosperous. In the sixth year of Hezekiah's reign the king of Assyria carried most of the people of Israel into captivity, but it was not until eight years later that he made an assault on the kingdom of Judah. At first Hezekiah offered him tribute, but when the demands became too great, they were refused. Then Sennacherib, the king of Assyria, advanced against Jerusalem, but God interfered by sending a plague into the Assyrian army, which killed about 185,000 in one night (*II Kings xix*, 35).

In his famous poem, *The Destruction of Sennacherib*, Byron describes how—

The Assyrian came down like the wolf on the fold,  
And his cohorts were gleaming in purple and gold,  
and tells in ringing verse of the catastrophe:

And the might of the Gentile, unsmote by the sword,  
Hath melted like snow in the glance of the Lord!

After the Assyrians' defeat, Hezekiah's reign was one of great prosperity for his nation, but he was warned by Isaiah of its future capture by the Babylonians. See SENNACHERIB.

**HIAWATHA**, *hi a wah' thah*, sometimes pronounced *he' a wah thah*, is the name of the hero of Longfellow's famous Indian epic, *The Song of Hiawatha*. Several of the North American Indian tribes had their legends of some such warrior, supernatural in his birth and in his strength, who had been sent to open up their rivers, show them the way through the forests, teach them many of the arts of peace, and, above all things, plant for them the maize, or Indian corn. These legends Longfellow

collected and wove into a poem which still appeals not only to children, but to all who—

Love the sunshine of the meadow,  
Love the shadow of the forest,  
Love the wind among the branches,  
And the rain-shower and the snowstorm.

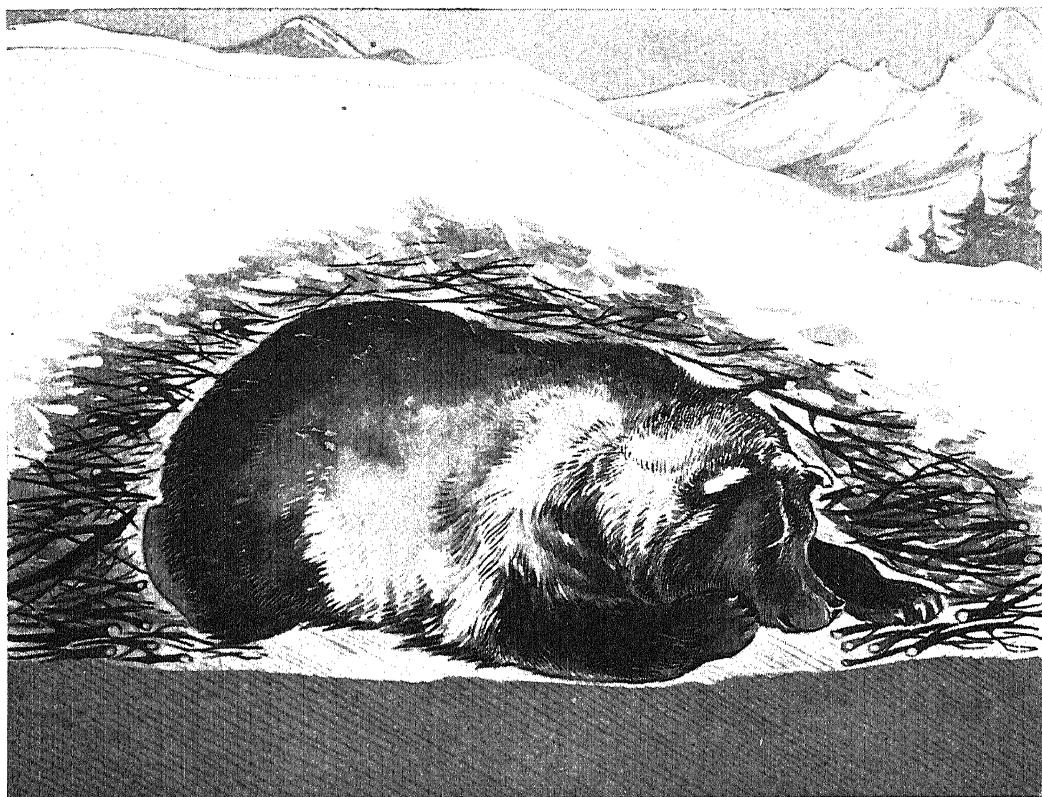
Of Hiawatha's birth and childhood; of his contest with the West-Wind, his father; of his fasting, his fishing, his wedding, his planting of the corn, his grief at the death of his friends and of his wife Minnehaha, and, finally, of his departure into "the land of the Hereafter"—all these and more the epic treats in the unrhymed verse which suits so well the subject. There is about the poem enough of an air of realism to make it interesting, yet the atmosphere of mystery, of something more than human, is felt throughout it. See AMERICAN LITERATURE (National Period). See illustration, page 3171.

**HIBBEN, JOHN GRIER.** See PRINCETON UNIVERSITY, subhead.

**HIBBING, MINN.** See MINNESOTA (back of map).

**HIBERNATION.** Before the icy winds roar through the tree tops and snow is piled high on the ground, many animals tuck themselves into out-of-the-way places and fall into a long sleep. That sleep is called *hibernation*, meaning *winter sleep*, from the Latin word *hibernus*, for *winter*. In that state, long periods of severe weather or scarcity of food are passed without discomfort to the animal. A similar state of sleeping occurring in summer months is called *estivation*.

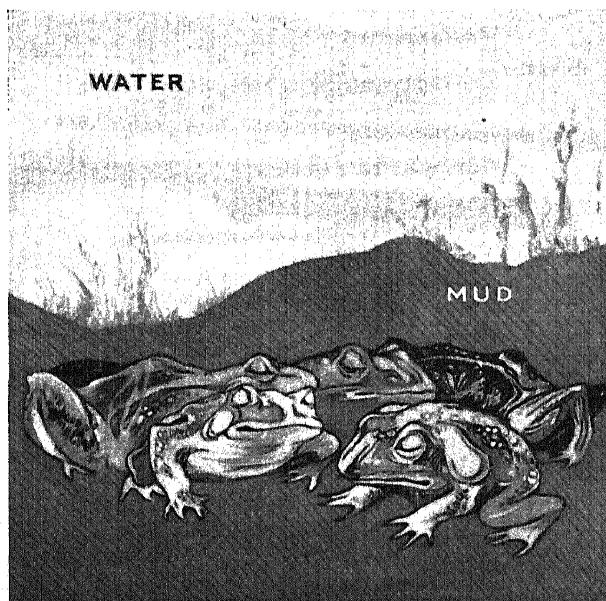
As the time approaches for the change, the animal grows fatter and becomes gradually slower in its habits, until finally it falls into



THE GRIZZLY BEAR IN WINTER

He is covered with leaves and snow in a protected spot on the mountain side.

a stupor. Some animals, such as the badger, do not waken until the period of cold or food-scarcity is passed. Others, such as the chipmunk and gopher, become active on pleasant days, partake of food which they have stored, and then go back to sleep. Each animal seems to be governed by habits which have passed down from generation to generation. When an animal awakens from a long hibernation, it may have lost thirty or forty per cent of its weight, for it has used its stored-up



"ASLEEP IN THE DEEP"  
Frogs spend the winter in the mud at the bottom of ponds.

fat during its long sleep, and is weak and inactive, but after it begins to eat, it quickly regains its natural vigor.

During hibernation, animals breathe very slowly and the heart scarcely beats. For that reason, a rude awakening sometimes will cause death. The body temperature of a hibernating animal is usually rather low, and may approach that of its surroundings. A slight increase in the temperature will generally awaken the sleeper. But hunger is prob-

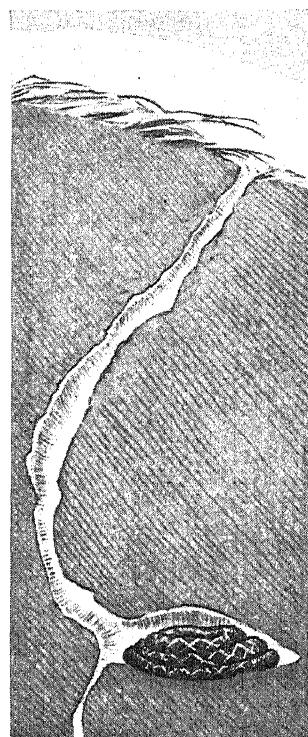
ably the call which it answers when once again it is time to become active.

Hibernating animals are chiefly vegetable feeders. Almost all burrowing animals hibernate, and among them the wood-chuck is most notable. The length of its winter sleep is regarded by some as a weather prophecy (see GROUND HOG). Bears, skunks, dormice, squirrels, prairie dogs, badgers, and bats also escape the rigors of northern winters by hibernation. Toads, frogs, and some reptiles, a few butterflies, and many other insects have similar long periods of inactivity. W.N.H.

**HIBERNIA**, the ancient name of Ireland, said to have been applied to it first by Julius Caesar. Frequent reference to it is found in the classics, notably in the writings of Ptolemy, who described the country in detail, under the name *Juverna*. See IRELAND (History).

**HIBISCUS**, *hi bis' kus*, the name of a genus of plants belonging to the mallow family (see MALLOW), several species of which are of commercial value. Among those cultivated as ornamentals are the *swamp rose mallow* and the *rose of Sharon*, or *shrubby althea*. The former grows wild in the marshes along the Atlantic coast of the United States, and thrives under cultivation, if given moist, rich soil. Its magnificent bell-shaped flowers, four to seven inches across, are rose-pink or white, and make a handsome showing on their tall stems, which may be six or seven feet high. This species is an herbaceous perennial. The *rose of Sharon*, a native of Asia, is a tall shrub with flowers resembling hollyhocks. A species sometimes cultivated in American greenhouses is the *Chinese mallow*, or *rose of China*, a plant having very showy scarlet petals. These stain black and are used by the Chinese to darken their eyebrows and teeth.

The okra of the vegetable garden, whose sticky pods are used in soups (see OKRA), is



HOW THE SNAKE PASSES THE WINTER

an hibiscus. Other species yield fiber, and the tropical *musk mallow* bears fragrant seeds used by manufacturers of perfumery. B.M.D.

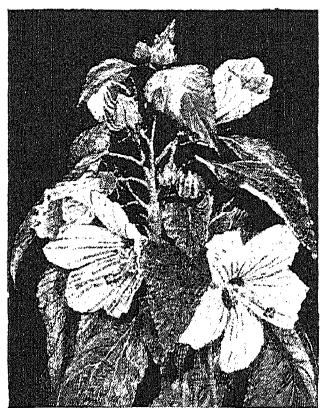
**Scientific Names.** The genus *Hibiscus* belongs to the family Malvaceae. The swamp rose mallow is *H. moscheutos*; the rose of Sharon, *H. syriacus*; the Chinese mallow, *H. rosa-sinensis*; the musk mallow, *H. abelmoschus*. Okra is *H. esculentus*.

**HICCOUGH, OR HICCUP**, *hik'-kup*, a sudden spasmotic intaking of the breath, attended by a peculiar, sharp sound. An attack of hiccup is brought on by a sudden contraction of the diaphragm, and

is attended by closure of the glottis, which is the opening from the pharynx into the larynx. The sound is caused by the rush of air against the closed glottis. Paroxysms sometimes last only a few minutes, but they may endure for several hours or even a number of days; in the latter case, death may follow from exhaustion. The cause of hiccup is some irritation in the oesophagus or at the stomach where it is attached to the diaphragm. It is therefore brought about by overfilling the stomach, by choking, or difficult swallowing, or by other sources of irritation in these organs. Hiccup sometimes accompanies pneumonia, peritonitis, appendicitis, and typhoid fever, and in these diseases is regarded as an alarming symptom.

Ordinary attacks of hiccup may be stopped by a long, slow intaking of the breath, after which the breath should be held as long as possible. Frequently, a case is relieved by a drink of water. Some persons can stop an attack by running the tongue far out of the mouth and keeping it out for two or three minutes. Ammonia, camphor, or musk will be found helpful in relieving more stubborn cases, but if the attack is long-continued, it may be necessary to administer a general anesthetic. See DIAPHRAGM. W.A.E.

**HICHENS**, *hich'enz*, ROBERT SMYTHE (1864- ), an English novelist whose best-known story, *The Garden of Allah*, was converted into an elaborate play which met with considerable success on the stage and in moving pictures. Another story, *Bella Donna*, was dramatized for Madame Nazimova. Hichens was born at Speldhurst in Kent, and was educated



HIBISCUS

The species known as the swamp rose mallow.

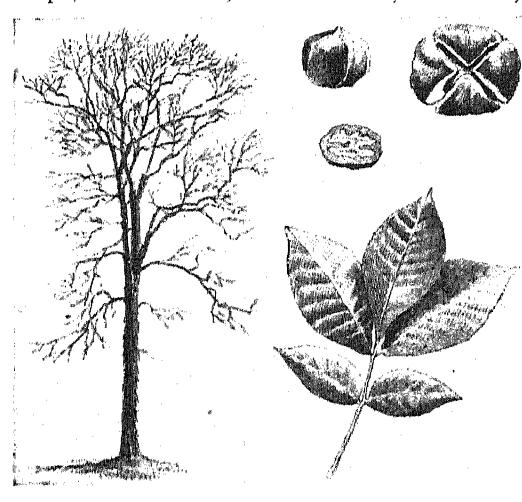
at Clifton College, the Royal College of Music, and the London School of Journalism.

**His Writings.** Among his novels, besides those mentioned, are *Green Carnation*, *Flames*, *Felix*, *The Dweller on the Threshold*, *The Way of Ambition*, *Mrs. Marden*, *The Spirit of the Time*, *After the Verdict*, and *Unearthly*. He also assisted in writing the play *Becky Sharp*, in which Mrs. Fiske was starred.

**HICKORY**, the name of a genus of nut-bearing trees belonging to the same family as the walnuts. They are native to North America. The hickories make beautiful park trees, and their hard wood is much valued as timber. It is extensively used in the manufacture of cask hoops, ax handles, chair backs, axletrees,



Photo: Brown Bros.  
ROBERT HICHENS



SHAGBARK HICKORY

The form of the tree, as seen in winter; the appearance of leaves; the nut in its case and out, and a cross section of it.

automobile wheels, carriage shafts, handles of golf clubs, and other implements where great strength and elasticity are required. The chief disadvantages of the timber are its rapid decay, caused by exposure, and its liability to destruction by worms. Hickory is highly esteemed as fuel, because it develops more heat than most other woods, and also for the high quality of charcoal which can be made from it. Bacon and ham cured by hickory smoke are said to possess exceptional flavor.

In forests, hickory trees grow to a height of fifty or sixty feet before branches appear, but

in open spaces they may grow widely spreading limbs. The fruit is a hard-shelled nut, grown in a husk which divides into four parts. The nuts of some species have a very delicate flavor, while others are quite bitter. The edible nuts of the *mockernut hickory* are greatly liked by Americans, and are also exported in large quantities.

B.M.D.

**Botanical Names of Species.** The species belong to the family *Juglandaceae*. The *mockernut hickory* is *Carya alba*; the *shellbark*, or *shagbark*, so called because on old trees the bark peels off in strips, is *C. ovata*; the *pignut*, whose nuts are bitter, is *C. glabra*. Other species, described elsewhere in these volumes under their particular names, are the *bitternut* and *pecan*.

**HICKORY, DICKORY, DOCK.** See **RHYMES OF CHILDHOOD**.

**HICKS, ELIAS** (1748-1830), an American Quaker preacher whose rejection of the doctrine of the atonement and denial of Christ's divinity caused a schism in the parent body. The definite organization of the sympathizers of Hicks, called *Hicksites*, dates from about 1828. He was born at Hempstead, Long Island, and began preaching in 1775. He refused compensation for his labors, and when not engaged in religious service, worked on his farm. Hicks was a vigorous opponent of slavery, and his upright life gave him great influence among his people. See **QUAKERS**.

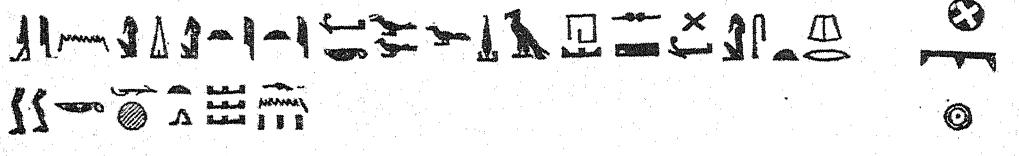
**HIERARCHY**, *hi' ur ah kie*, a term used by religious writers to describe the whole governing and ministering body of the Church. The word, in its strict sense, can be applied only to those Churches which are governed by prelates, such as the Roman Catholic and Anglican churches. The term has two divisions, order and jurisdiction. The first embraces all the various classes of ministers who direct worship, administer sacraments, and perform other duties of their calling, whether established by divine or by religious authority. The hierarchy of jurisdiction deals directly with the government of the Church and, beginning with the Pope, comprises all degrees of religious authority.

**Derivation.** The word is from the Greek *hieros*, which means *sacred*, and *arche*, meaning *government*.

**HIERATIC, hi' ur at' ik**, WRITING. See **HIEROGLYPHICS**.

**HIERO**, *hi' e ro*, a king of Syracuse. See **ARCHIMEDES**.

**HIEROGLYPHICS, OR HIEROGLYPHS**, *hi' ur o glif' iks*, *hi' ur o glifs*, names applied by the Greeks to the symbols carved by the Egyptians on their monuments, and in more modern times to any form of picture-writing, particularly that of the Aztecs and the early American Indians. The hieroglyphics of the Egyptians, called sacred because the Greeks fancied that they dealt only with religious topics and were understood only by the priests, have claimed the



EXAMPLE OF SYMBOLIC WRITING

In symbolic, or topical, writing, one object was substituted for another, to which it bore resemblance. The above inscription was placed on Triumph Hall by the Egyptian Thothmes III, and has been translated thus: "I sent: I order that you reduce and crush all the high officers of Tsahi. I cast them together with all their possessions at thy feet."

attention of scholars for centuries, and still present some extremely interesting problems.

Pure picture-writing is a very simple and primitive matter. If the savage wishes to represent a man, a bird, or an arrow, he simply draws rude pictures of those objects; and these may be understood by anyone, irrespective of his language. Thus, an Eskimo could "read" the picture-writing of an Aztec as well as he could that of his neighbor. But pure picture-writing serves but few purposes, while it inevitably suggests the need for a more practical system of representing ideas. Thus the *ideographic writing*, or ideograms, as the picture-writing is called, gives place to symbols which represent sounds, either alphabetic or syllabic; and when the latter have completely superseded the former, writing in its modern sense has been achieved.

**The Egyptian Symbols.** Presumably the Egyptian hieroglyphics were originally pure pic-

are very clear, if the system is understood. Thus a man in the attitude of prayer means not just "a man praying," but *worship*; a pair of legs represented *walking*; an outstretched arm with a stick, *strength*. Side by side with these there existed the phonetic symbols, probably developed originally by taking short words containing one dominant consonant sound to represent that consonant.

But the complications of Egyptian hieroglyphic writing did not cease even there. So long as the only writing to be done consisted of carefully carved inscriptions on obelisks or tombs, it was possible to preserve the original pictorial form of the symbols, whether these were ideographic or phonetic. But when written language came into more common use for literary and commercial purposes, the picture-writing was too cumbersome. Gradually, from the hieroglyphs, therefore, there was evolved the so-called hieratic, or priestly, writing, in which the earliest Egyptian books have been



ENIGMATIC WRITING

An emblematic figure is put in lieu of the one intended to be represented. The above, translated, reads: "In your transformation as golden sperbe you have accomplished it."

ture-writing, but the gap between that and the combination of ideograms with phonetic symbols must be bridged by the imagination, for the very earliest inscriptions extant, which date perhaps from 5000 B.C., contain both forms. Some of the symbols yield their meaning at the first glance; a man, a woman, are easily distinguished; so is a child, when it becomes evident that the figure is engaged in *sucking its thumb*. But general nouns, such as *mankind*, must be represented, and this is done by drawing both a man and a woman. Abstract ideas called for more ingenuity, but even here most of the signs

preserved. This hieratic writing shows but faint traces of its original pictorial character, and even these were lost in the *demotic* form, which developed between the eighth and the fourth centuries B.C. The name, which means *common* or *popular*, in which we may trace the English word *democratic*, was given it by the Greeks because, when they first came into close contact with the Egyptians, this latest form of writing was employed for everything except religious literature. With the introduction of Christianity into Egypt, the use of the old writing forms declined, and no inscriptions are to



## PHONETIC WRITING

This is purely alphabetic or syllabic The above is translated thus. "Out of bad comes good."

be found in any of the three styles after the middle of the fifth century B.C.

Throughout the Middle Ages and well into modern times, no interest was felt in these old hieroglyphics, but from the seventeenth century, scholars made occasional efforts to decipher the inscriptions. The problem seemed insoluble, however, until discovery of the famous Rosetta Stone threw light upon it. This stone, found in 1799 by an officer in Napoleon's army, contains an inscription, relative to the coronation of Ptolemy V, in three forms—in Greek, in the late Egyptian demotic, and in hieroglyphs, the Greek version closing with the statement that it was a translation of the two preceding inscriptions. The hieroglyphic text was badly mutilated, but at length a French scholar, François Champollion, hit upon the proper clue and discovered the phonetic value of many of the signs. Later discoveries confirmed the theories of Champollion, and an immense literature on the subject of hieroglyphics has resulted from the more recent studies of scholars. There now exist dictionaries and grammars of the language of the hieroglyphs, but the subject is by no means a closed one to-day.

An interesting fact about the hieroglyphs concerns the direction of the writing. This was not, as in most writings, fixed, but depended on the whim of the writer or the shape of the material to be inscribed. Sometimes hieroglyphics were to be read from right to left, less commonly from left to right; while frequently they were to be read vertically downward.

The cuneiform inscriptions and also the writing of the Chinese developed from an original pictorial form, and in some of the letters which make up the alphabets of European peoples, the primitive ideograms may be traced (see ALPHABET and the various letters, A, B, C, etc.).

Two early civilizations on the North American continent, the Aztec and the Maya, have left hieroglyphic records in Yucatan and Mexico which are of much interest to scholars. The writing has not been completely deciphered, but it is certain that it had progressed beyond the point of employing one picture or symbol for one idea. Recent excavations in the Valley of Mexico have disclosed hieroglyphic stones in the Maya language which scientists believe to be at least 8,000 years old, and which repre-

sent a civilization highly developed at that remote period. See WRITING; ROSETTA STONE.

**Derivation.** *Hieroglyphics* is from Greek words meaning *sacred* and *carve*.

**HIGGINS, EDWARD JOHN**, (1864- ), general of the Salvation Army, and distinguished as the first head of the organization selected outside of the Booth family. When the High Council of the Army sought a successor to General Bramwell Booth, whom they regarded as unfit for further service on account of failing health, Commissioner Higgins was chosen. The action of the Council was generally regarded as a change of the Army's form of government from a kindly despotism to a more democratic sort of control.

General Higgins was born at Highbridge, Somerset, and educated at Dr. Morgan's School, Bridgewater, and at Cheltenham College. On his entrance into the Army service, in 1882, he was first made a divisional officer in the London slums. His ability was soon recognized, and he was promoted to an educational post in the International Training House, London. He served there until 1905, at which time General Booth appointed him chief secretary to Commander Evangeline Booth, in the United States. After eight years' service in that post, he was recalled and made assistant foreign secretary at the London headquarters. Later, he became commander of the Army for Great Britain, and during the World War, he was made commissioner and chief of staff under General Booth.

General Higgins' work in America was noteworthy for the increase in the Army's resources which he brought about, and for the establishment of a firm financial basis for the institution. During the World War, he was largely responsible for selecting the forces that went to the front, and for the financial management that made the Army's activities possible.

His election as general, in 1929, was enthusiastically received in America, and was regarded as a step in advance for the Salvation Army and its cause. See SALVATION ARMY; BOOTH (family).

**HIGGINSON, THOMAS WENTWORTH** (1823-1911), an American essayist, active in anti-slavery agitation before the War of Secession, and an earnest advocate of woman suffrage

during the greater part of his life. He was born at Cambridge, Mass. After graduating from Harvard, he studied for the ministry, but his anti-slavery views forced his resignation. He plunged into the free-state struggle in Kansas, and joined in rash schemes to liberate John Brown. In the War of Secession, he was made colonel of the first regiment of freed slaves mustered into the national service. He afterward devoted himself to literature.

**HIS WRITINGS.** His best-known books, besides two histories of the United States, are *Out-door Papers*, *Army Life in a Black Regiment*, *Common Sense about Woman*, *On Writing and Speech-Making*, and a memoir of Longfellow, his friend for many years.

**HIGH CHURCH PARTY.** See ANGLICAN CHURCH; CHURCH OF ENGLAND.

**HIGHER CRITICISM.** See NEW TESTAMENT CRITICISM.

**HIGHER EDUCATION.** See EDUCATION, subhead.

**HIGHEST COMMON FACTOR.** See GREATEST COMMON DIVISOR.

**HIGH GERMAN.** See GERMAN LANGUAGE.

**HIGH-HOLDER.** See FLICKER.

**HIGH-HOLE.** See FLICKER.

**HIGH KNOB,** the highest point of land in New Jersey (which see).

**HIGHLAND FLING,** a national folk dance of Scotland. See DANCING.

**HIGHLAND PARK, MICH.** See MICHIGAN (back of map).

**HIGHLANDS OF SCOTLAND.**

See SCOTLAND.

**HIGH MASS.**

See MASS.

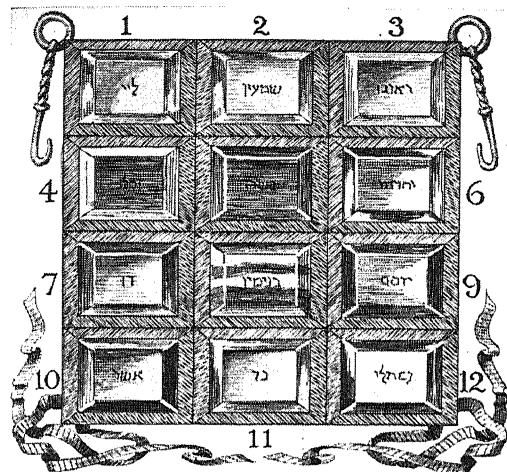
**HIGH POINT, N.C.** See NORTH CAROLINA (back of map).

**HIGH PRIEST,** the head of the Jewish priesthood, whose duties included the oversight of the sanctuary and all that belonged to the sacred service. On the Day of Atonement, he alone was permitted to enter the Holy of Holies in the Temple. Besides these especial duties, he

presided over the Sanhedrin when religious questions were being discussed, offered sacrifices on special days, and was qualified to dis-

charge any priestly function. He was always shown the highest honor.

A high priest could not assume the office until he was twenty years of age, and his conduct was governed by special laws (*Lev. xxi*,



HIGH PRIEST'S BREASTPLATE

The illustration is that of the breastplate of the second Temple, as distinguished from the Mosaic breastplate. The precious stones were arranged as follows:

- |                  |                  |
|------------------|------------------|
| (1) Emerald      | (7) Amethyst     |
| (2) Chrysolite   | (8) Banded agate |
| (3) Carnelian    | (9) Sapphire     |
| (4) Onyx         | (10) Jasper      |
| (5) Lapis lazula | (11) Beryl       |
| (6) Ruby         | (12) Topaz       |

1-15). His official garments were rich, comprising a blue robe partially covered with an embroidered vestment, called an *ephod*, a cap, and a square breastplate made of gold, set with four rows of precious stones, three in a row. This costume was laid aside on the Day of Atonement, for he wore pure white linen to enter the Holy of Holies. Aaron was the first to be appointed to this office after the establishment of the Covenant at Sinai, and for a long time the office was for life, but Herod and the Romans grew jealous of the priestly power, so they appointed high priests whenever they wished and deposed them at their pleasure.

**HIGH RELIEF,** a term in sculpture. See RELIEF.

**HIGH SCHOOLS.** See SCHOOL (Public Schools).

**HIGH SEAS,** a term applied to all parts of the oceans and open seas more than three miles from land. It does not refer to bays, harbors, or landlocked waters. Within the three-mile limit, the control of the sea belongs to the nation whose coast the sea washes. Beyond the three-mile limit, the sea becomes an international area, accessible, by agreement of all



JEWISH HIGH PRIEST

nations, on equal terms to all. Vessels of a friendly power may be searched while within the three-mile limit if arousing suspicion in any way, or if necessary they may be pursued and searched beyond those limits. In time of war, belligerent nations exercise the right of search on the high seas in connection with neutral vessels suspected of violating neutrality laws. Such vessels may also be captured if found running a blockade maintained by a power at war. Such was the world-wide understanding before the World War, which began in 1914. In that struggle, both sides violated the laws of neutrality.

**Related Subjects.** The reader is referred in these volumes to the following articles:

International Law      Search, Right of  
Neutrality      World War

**HIGH TIDE.** See TIDES.

**HIGHWAY.** See ROADS AND STREETS;  
TRAILS OF EARLY DAYS.

**HIGHWAY ROBBERY.** See ROBBERY.

**HILDEBRAND.** See GREGORY (VII, Pope).  
**HILKIAH,** *hil ki' ah*, father of Jeremiah  
(which see).

**HILL,** an elevation of land usually rising less than 2,000 feet above the surrounding country, and formed in several ways. Hills are formed by glaciers, which on melting leave stones and sand; by the wind (dunes); by volcanic action; or by gradual wearing away of uplands by weathering and erosion. They present a pleasing aspect in any generally level country, and when many are closely grouped, they may become notable for their scenic beauty. The Berkshire Hills in Massachusetts are covered with trees and carpets of grass, and are so beautiful in effect that many people admire them as much as more impressive mountains. Some hills which are a great deal higher than the land around them are often incorrectly called mountains; those near the base of a mountain range are called *foothills*.

R.H.W.

**Related Subjects.** The reader is referred in these volumes to the following articles:

Erosion      Moraine      Mountain

**HILL, JAMES JEROME** (1838-1916), the man whose foresight and energy made him the foremost leader in developing the great Northwest of the United States and Canada, was born on a farm near Guelph, Ont., and educated at the Rockwood, Ont., academy. The death of his father, when James was a lad, necessitated his leaving school, and for a time he worked in a local store for four dollars a month. At the age of sixteen, he left home and went to Saint Paul, Minn., then a village of about 5,000 inhabitants. Here he secured employment with a steamboat company, and his honesty, industry, and business ability led to rapid advancement.

At the age of twenty-five, he was agent of the Northwestern Packet Company. Five years later, he organized the Red River Transportation Company, which was the first to open communication between Saint Paul and Winnipeg. This was the first of a series of enterprises which culminated in the completion of the Great Northern Railway system, with its line of steamers connecting Puget Sound with the Orient. The next important event in this series was the purchase of the Saint Paul & Pacific Railroad by a syndicate which Hill organized.

The company was reorganized in 1879 as the Saint Paul, Minneapolis & Manitoba Railway Company. To this organization he devoted the remainder of his life, and was recognized as its controlling genius, whatever the official position he held.

The new company built lines of railway across Minnesota into Dakota, and one extending northward as far as Winnipeg. In 1890 these roads became a part of the Great Northern system, the main line of which, extending from Duluth to Puget Sound, was built between 1888 and 1893, with Hill as the chief promoter. This was the first transcontinental railroad built without government aid. The Great Northern Steamship Line, spanning the Pacific Ocean, completed the connection with China and Japan.

Hill was a leading authority on transportation and one of the outstanding financiers of America. His advice was sought in the great financial centers, and he became vice-president of the New York Chamber of Commerce and a member of the board of directors of several of the largest banks.

In addition to his organizing and managerial abilities, Hill was a convincing public speaker and a fluent writer. He was known also for his simplicity of life and his kindness, as is evidenced by his gift of \$500,000 to found a theological seminary in Saint Paul. *Hill Country*, a fictionized biography of this railroad-builder, by Ramsey Benson, was a successful publication of 1928.

**HILO,** *he' lo.* See HAWAII (Cities).

**HIMALAYA,** *him ah' lay yah*, the highest mountain system in the world, situated in Asia. The word is Sanskrit and means the *abode of snow* or the *snowy range*. The name is usually confined to the great rampart of mountains that

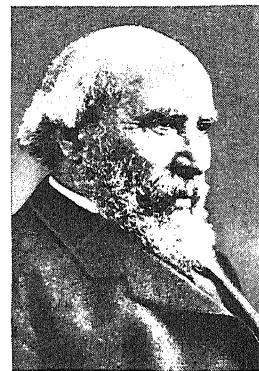


Photo: U & U

**JAMES J. HILL**  
Master railroad builder of America.



Photos: GROG

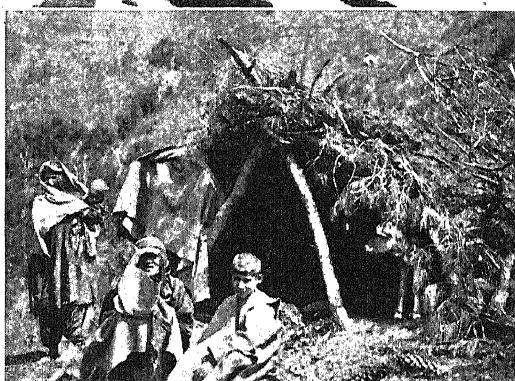
## NEAR THE "TOP OF THE WORLD"

A spot in the Himalaya chain, nearly three miles above sea level. The highest point, a few miles distant, reaches almost three miles more in altitude. It is declared by explorers that on the bare patches at the edge of the snow at the height shown in the illustration, primroses bloom during the short summer. Below is a temporary home of shepherds on the side of the Himalayas, in Kashmir.

encircle the northern part of the peninsula of India and separate it from the elevated table-land of Tibet. They sweep in a gigantic arc which has its rounded side turned south, and stretch from the great bend of the Indus on the west to the great bend of the Brahmaputra on the east. These two rivers rise in Tibet only a few miles distant from each other, on the northern slopes of the Himalayas.

The length of this mountain system is nearly 1,500 miles, and its breadth is between 100 and 200 miles. The Himalayas are not formed of one single chain of mountains, but consist of several high parallel ranges, capped by a great number of rugged, snowy peaks and intersected by great valleys and extensive table-lands. The nucleus of this system is situated to the northwest, outside the boundaries of India, in the Pamir, one of the loftiest regions of the world. The Himalayas are connected with the mountains of Asia which stretch east and west. Immediately west of them is the Karakoram, or Muztagh chain, from which they are separated by the pass of the same name, situated at an altitude of 19,000 feet above sea level.

**Peaks, Passes, Glaciers.** From the plains of Northern India watered by the Ganges, which have an elevation of about 1,000 feet above sea



level, the Himalayas ascend by successive slopes. They contain the highest peaks in the world, the loftiest of which, Mount Everest, has an altitude of 29,141 feet. Not far from it rises Kanchanjanga, 28,156 feet high, the second highest peak in the Himalayas. Both of these peaks can be seen from the mountain resort of Darjiling, in India. The view reminds one of Mont Blanc, the highest peak in the Alps, as seen from Chamonix. However, the variety of incidents, the richness of color, and the sharp contrasts, which are so characteristic of the Alpine landscape and constitute its picturesqueness, are lacking in many of the gray, barren peaks of the Himalayas. The majesty and the grandeur of these stupendous ranges have a fascination of their own, and they strongly impress all who see them.

The passes which traverse these mountains are among the loftiest in the world, for few of them are at lower altitude than 15,000 to 16,000 feet. Because of the snows, the passes above 16,000 feet are inaccessible from No-

vember until May. Numerous glaciers, some of which exceed in size the great Alpine glaciers, are found in many parts of the range.

**Vegetable and Animal Life.** The vegetation is extremely varied, and on the steep southern slopes it is very luxuriant. Tropical plants, such as the plantain, fig, and palm trees, are found up to a height of 3,000 feet. The forest-covered slopes also contain an abundant growth of shrubs and climbing plants in wonderful profusion. Oaks, chestnuts, and laurels are common, and are found up to a height of 7,000 feet, while deodar and pines grow up to 12,000 feet elevation. These mountains are famous for their wonderful growths of rhododendron. The tea plant is cultivated up to 5,000 feet on the southern slope; rice, corn, and millet are grown up to 6,000 feet; wheat and barley are found at a slightly higher altitude.

The animal life is also abundant and varied. In fact, the Himalayas form one of the richest zoölogical regions in the world, peopled with species found in the tropical, temperate, and cold zones. The tiger, leopard, rhinoceros, elephant, and monkey are found here at high altitudes. This region is the home of the yak. No other part of the world is so rich in birds as these forest-clad mountains, for almost all kinds are well represented. For maps, see ASIA.

**Related Subjects.** The reader is referred in these volumes to the following articles:

|         |       |       |     |
|---------|-------|-------|-----|
| Everest | Pamir | Tibet | Yak |
|---------|-------|-------|-----|

**HIND**, a female deer. See DEER.

**HINDENBURG, PAUL VON BENECKENDORFF UND VON (1847- ),** Germany's military leader in the World War, and the first President of the German republic elected by popular vote. From his youth he lived in an atmosphere of militarism. Born in Posen, he entered a cadet school at the age of eleven, and later, in a Prussian cadet corps, the hard discipline developed in him an inflexible will and strong resolution. At the age of nineteen, he was a junior staff officer.

At the outbreak of the World War in 1914, he was a retired general, living on a pension. He was not welcomed at headquarters, because he was believed to be a man of one idea, and that an unsound one. During his long career in the army, he had for a time been a staff officer in East Prussia and had planned some of the annual military maneuvers there. Later, as a lecturer on applied tactics in the War Academy, he located many of his imaginary battles in the region of the Masurian Lakes, in Northeastern Prussia. For years he had been subjected to good-natured ridicule because he had insisted upon the military importance of that low, marshy land. In this region, on August 29, 1914, just a week after the kaiser had re-

called him from retirement in the hope that, after all, he might be right in his opinion regarding the Masurian section, he overwhelmingly defeated two Russian armies, whose men he claims outnumbered his own three to one. It is said that he took 120,000 prisoners, enough to have ended any previous war (see WORLD WAR).

Much of his subsequent success is said to have been due to his extensive employment of railways for troop movements. Von Hindenburg became the military idol of the German people, and a gigantic wooden statue of him was erected in Berlin in 1915. Emperor William raised him to the highest military rank, that of field marshal, and made him chief of the general staff. In November, 1918,

Hindenburg was possibly the most insistent of all the kaiser's advisers that the latter abdicate as emperor and king, and seek refuge in a neutral country.

In 1925 the Nationalist (imperialistic) party nominated him for President of Germany, despite his age. He was elected by nearly 900,000 plurality. The event caused unrest in allied countries, where it was feared that Germany was planning to return to a monarchical form of government. However, he disappointed his critics, for he did not waver in fealty to the republican Constitution. For events of his administration, see GERMANY (History).

**HINDENBURG LINE.** See WORLD WAR.

**HINDI, hin' de,** a dialect of India. See INDIA (Languages).

**HINDUISM,** a religion of the Far East. See BRAHMANISM.

**HINDU KUSH, hin' doo koosh,** a range of mountains in Central Asia. For 500 miles it forms a great watershed between the Indus and the Oxus rivers, and for 200 miles is the southern boundary of Afghanistan. The highest peak is Tirach Mir, a snow-clad giant rising to a height of about 25,000 feet. This range, which is really a continuation of the Himalayas, was called the Caucasus by historians of Alexander the Great. It is said that Timur endeavored to cross these mountains, and left a record of his attempt engraved on a rock. See TIMUR.



Photo: U & U

VON HINDENBURG

The great field marshal of Germany who fought loyally for his emperor in the World War and later became the able and patriotic President of the German republic.

**HINDUSTAN, OR HINDOSTAN**, *hin doo-stahn'*, is a name commonly applied to the whole peninsula of India, but more correctly confined to the valleys of the Jumna and the Ganges rivers. It does not include the Punjab, though the natives of that territory speak the Hindostani language.

**Meaning.** *Hindostan* is a Persian word which means the *land of the Indus or Hindus*. In the Hindostani tongue there are still many Persian words and phrases. See INDIA (Languages).

**HIN NOM, VALLEY OF.** See GEHENNA; JERUSALEM.

**HIPPARCHUS**, *hip' pahr' kus*, the founder of scientific astronomy. Two great men stand out among all the astronomers of antiquity, Hipparchus and Ptolemy. The former, a Greek, was born in Nicaea, about 160 B.C., a time when the Greeks were colonizing Southwestern Asia. He lived for a time at Rhodes and then went to Alexandria, in Egypt, the great center of learning of that time. There he studied and made remarkably accurate observations of the heavens, and on these his fame rests. He prepared a catalog of 1,080 fixed stars, classified according to brightness. Ptolemy later used this catalog and preserved it for future generations. See PTOLEMY.

Hipparchus also observed and calculated the exact length of the seasons, the length of the year, and the motions of the planets and the moon in their orbits. In order to make records of all these things, he had to enter the hitherto unknown sphere of higher mathematics, so he originated what is now known as trigonometry; he also designed the planisphere, a diagram of the heavens with a circular cover, which when moved shows the exact positions of the heavenly bodies at different times.

**HIPPARCHUS**, a ruler of ancient Athens (which see).

**HIPPIAS**, *hip' ih as*, a ruler of ancient Athens (which see).

**HIPPOCAMPUS**, *hip' o kam' pus*, OR **SEA HORSE**, an oddly formed sea animal, belonging to the same family as the pipefish (see PIPEFISH). There are about twenty species, inhabitants of tropical and temperate waters. The name hippocampus, which comes from two Greek words meaning *horse* and *sea monster*, was given this animal because of the similarity between its head and that of a horse. A hippocampus has a protruding snout, prominent eyes, and high cranium, and is like a fish only in that it lives in the sea and breathes by gills. Its body, from six to ten inches in length, ends in a long tail which is tightly coiled inward, and the animal is covered with a series of bony plates which have spiny projections along the places of connection. It moves about in an upright position, but is a weak swimmer, and usually is found with the

tail clinging tightly to bits of seaweed. As is true of the pipefish, the male hippocampus keeps the eggs laid by the female in a pouch



Photo: Visual Education Service

#### THE HIPPOCAMPUS

on the under side of its body, where they are taken care of until hatched. L.H.

**Scientific Name.** The common sea horse of North America is *Hippocampus hudsonius*.

**HIPPOCRATES**, *hip' ok' ra teez* (460-357 B.C.), the greatest of the old Greek physicians, often called the "Father of Medical Science," was born on the island of Cos, off the coast of Asia Minor. He was believed by the Grecians to be the descendant of a god, and he became a priest-physician. Hippocrates used temples as hospitals, which had a full measure of pure air, water, and sunshine; while the patients offered petitions to their heathen gods, they were treated for their ailments by Hippocrates and his disciples. One of his discoveries was that certain diseases could be traced by listening to the sounds made in the chest of a person, but this knowledge did not become really useful until 2,000 years later. He bound his students by a solemn oath to behave with honor and never to divulge a sick-room secret. His writings embrace books on epidemics, air and water, and on diet and hygiene. He traveled throughout Greece, and died at an advanced age in Thessaly. See ALCHEMY.

**Hippocratic Oath**, a pledge taken by the followers of Hippocrates, which has become the basis of our present-day system of medical ethics. Students of medicine bound themselves to behave with honor, and never to divulge a sickroom secret. They also pledged themselves to keep their teachers from becoming indigent; to train their sons in their own profession, if the latter desired to become physicians; to "take their own medicine," as it were, by following the regimen recommended for their patients; to give no harmful medicines; to lead pure and self-sacrificing lives; and to enter the houses of the sick only for healing purposes.

**HIPPOCRENE**, *hip' o kreen*. See PEGASUS.

**HIPPODROME**, originally a place set apart by the ancient Greeks for horse- and chariot-racing, and later for boxing, wrestling, running, etc. The most famous ancient hippodromes were those in Olympia and Constantinople, and the Circus Maximus at Rome (see CIRCUS). These were of vast proportions, accommodating from 100,000 to 500,000 spectators. The term has also been applied to race tracks in England and France, to the modern indoor circus, and, in particular, to two great amusement palaces, in London and in New York. In the latter city, the structure occupied an entire block on Sixth Avenue, between 43rd and 44th streets. It was the largest standard playhouse in the world, having a seating capacity of 5,200; it was open until 1928. Many spectacular and mammoth productions have been staged there. The stage, which accommodated 500 people at one time, was circular, and while one half was before the audience, the other half was being prepared for the scene to follow. An immense tank in front of the stage, a part of the stage accessories, capable of accommodating over twenty rowboats, could be filled with water in five minutes.

**HIPPOLYTA**, *hip ah'l ih tah*, queen of the Amazons (which see).

**HIPPOLYTUS**, *hip pol' ih tus*. See PHAEDRA.

**HIPPOMENES**, *hip o me' neez*. See ATLANTA; MYTHOLOGY (Atalanta's Race).

**HIPPOPOTAMUS**, *hip o pot' a mus*, a monstrous, clumsily built land and water animal of tropical African marshes, swamps, and river courses. Two living and several extinct species constitute a family of mammals related to the swine family, though the name means *river horse*. One species, the common hippopotamus, often weighing 8,000 pounds, is, next to the elephant, the most bulky of land animals. The other, the rare pygmy, or Liberian, hippopotamus, is much smaller, weighing but from 400 to 600 pounds. The pygmy also differs slightly from the common hippopotamus in color and habits.

**The Common Hippopotamus**. This species is a huge, thick-skinned creature with a heavy, barrel-shaped body set on four short, thick legs. Each foot has four toes, which are connected by webs, and rest flat on the ground,

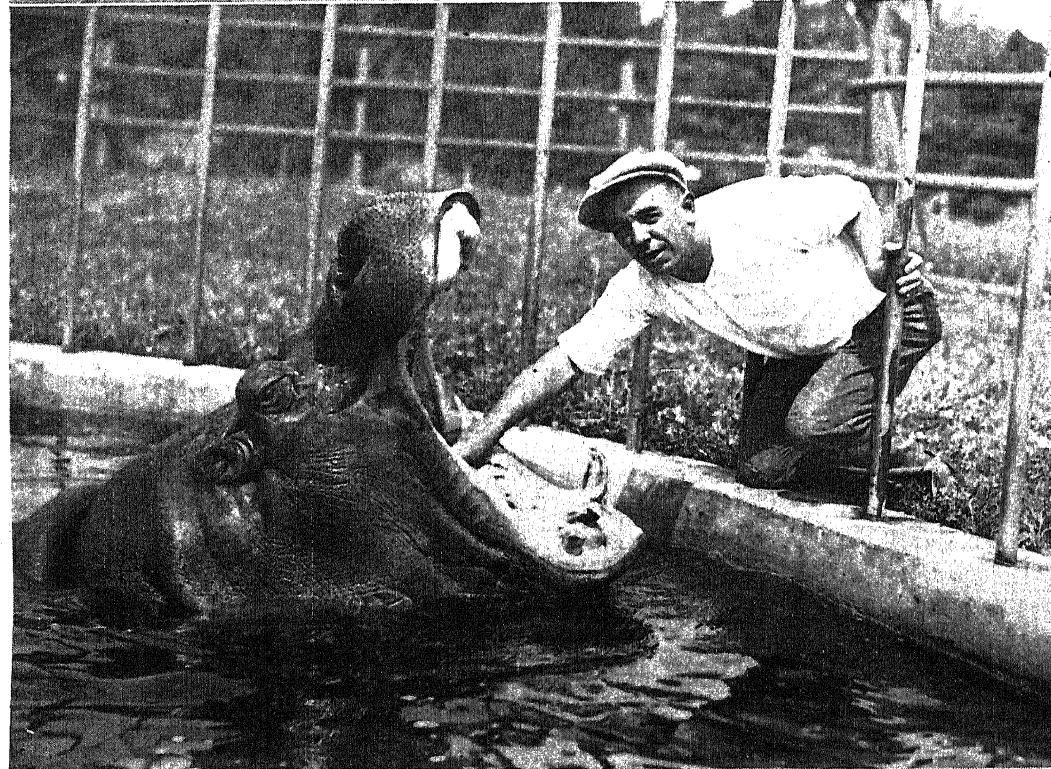
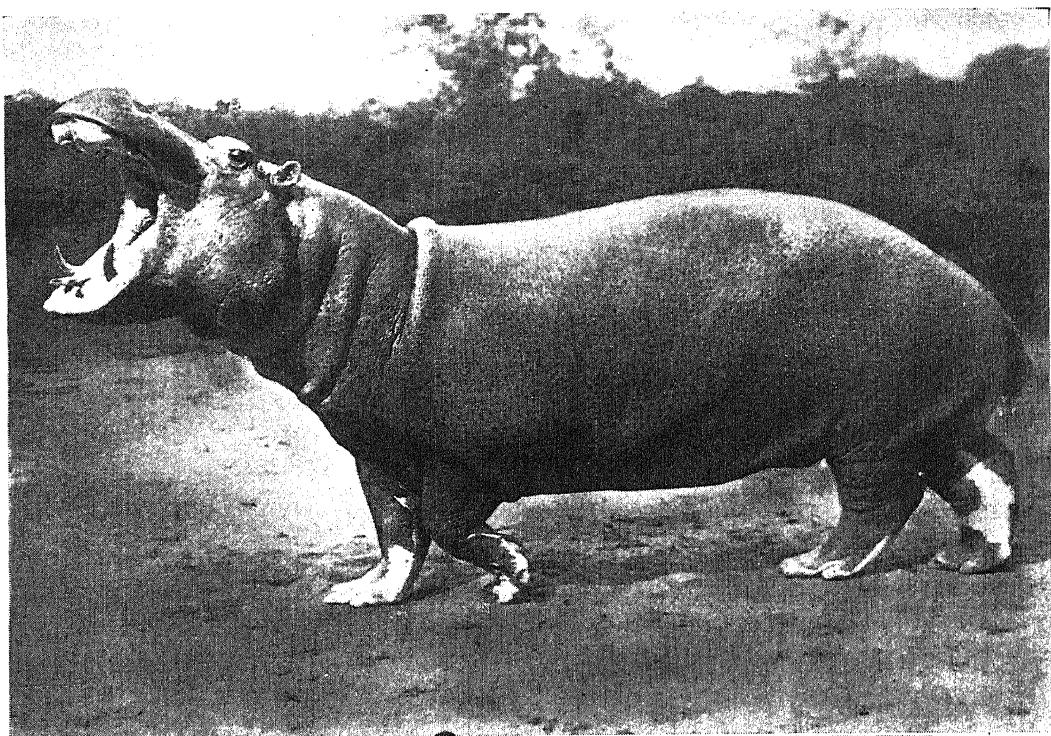
The head is large, lumpy, and ugly, and is so heavy that the animal usually props its chin on some support when out of water. The ears and eyes are small and piglike. Eyes and nostrils are set so high that only a small portion of the animal's face need remain above the water to enable it to see and to breathe, while the rest of the body is safely hidden. The mouth of a hippopotamus is enormous. When opened to its full spread of three or four feet, the powerful grinding, biting, and rooting teeth may be seen. The great canines develop into strong tusks. Thus equipped, the creature is able to root up rank grasses, cut through tough stems like a scythe, and masticate the coarsest vegetable food with ease. Its tusks are also used for fighting and in killing crocodiles.

The skin of the hippopotamus is spongy, rough, thick, and naked, except for a few bristles on the muzzle and small bunches of short hair on head, neck, ears, and tail. The tail is very short. A remarkable characteristic of the hippopotamus is the red, oily substance known as *blood sweat*, which flows through the pores and covers the skin of the animal when it is excited.

Although clumsy on land, the hippopotamus is an excellent swimmer and diver. It can remain under water a long time, and when it comes to the surface, it spouts water from its nostrils like a whale, though the stream is not at all powerful. A male hippopotamus stands nearly four feet high at the shoulder when full grown, and is from twelve to fourteen feet long. The color varies from dark brown to bluish-gray. Females are somewhat smaller and usually of lighter color. One baby hippopotamus is born to a female each year. It is taken to the water immediately, but is carried on the mother's neck until it learns to swim. It takes six years for it to attain its full growth, and thirty or more years is the average life of a hippopotamus.

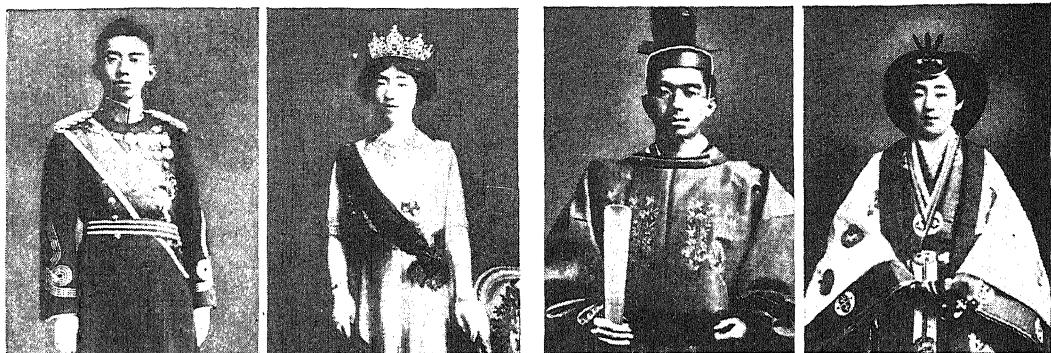
Hippopotamus flesh and fat are eaten by the natives of Africa. The hides are used for handle covers, whips, and other purposes, and the tusks and teeth, which are harder and less liable to turn yellow than the ivory of elephants' tusks, were at one time in demand for the making of artificial teeth. Hippopotamus-hunting is a dangerous sport. The huge creatures can easily capsize boats, and in general are bullet-proof except for a small spot behind the ear. To obtain a specimen for a zoölogical garden, it is necessary that a mother hippopotamus be harpooned and brought to land. A baby hippopotamus in search of its mother is then easily captured alive, caged, and tamed. See illustration, page 3184. W.N.H.

**Scientific Names**. The hippopotamus belongs to the family *Hippopotamidae*. The common species is *H. amphibius*.



Photos: Wide World; P & A

**Two of America's Specimens.** A young hippopotamus, born in the National Zoölogical Gardens, Washington, D. C., but now in Saint Louis. The picture shows him at nearly four years of age and weighing 3,000 pounds. Below, a specimen in Franklin Park Zoo, Boston; his keeper is massaging his tonsils.



Photos: U &amp; U

HIROHITO AND THE EMPRESS

At left, the royal pair in Western costumes; at right, they are shown in full ceremonial robes, prescribed by court etiquette.

**HIRAM, KING OF TYRE.** See PHOENICIA.  
**HIROHITO**, *he' ro he' toh* (1901- ), emperor of Japan, who succeeded to the throne at the death of his father, Yoshihito, on Christmas Day, 1926 (December 24 in the Western world). He had acted as regent of Japan since November 25, 1921, because of the illness of his father.

In 1928, in accordance with Japanese traditions, the emperor was crowned at Kyoto with colorful ceremonies which were prolonged for more than a week.

While a true son of Nippon, Hirohito is in full sympathy with the spirit of modern progress. He was educated under private tutors at the Imperial Education Institute in Tokyo, and when eighteen was given a seat in the House of Peers in the Imperial Diet. In the spring of 1921 he made a visit to Europe, the first time a Japanese crown prince ever left his native land.

The attempted assassination of Hirohito in 1923 by a radical student aroused the entire nation, for his democratic friendliness endears him to the people. He was married in 1924, with ancient Shinto rites, to the Princess Nagako, daughter of Prince Kuni. See JAPAN (Late History).

**HIRSCH, MAURICE**, Baron de (1831-1896), an Austrian financier, capitalist, and philanthropist of Jewish descent, was born at Munich. The great wealth which he inherited from his father was increased by marriage and by his banking and railroad enterprises. His fortune was estimated at \$200,000,000, and his income at from \$15,000,000 to \$20,000,000 a year. He and his wife donated about \$115,000,000 to charitable purposes, largely for the education and betterment of the Jews. He established industrial institutions in Egypt and Turkey, and in 1888 offered \$10,000,000 to the Russian government for schools, provided no race or religious distinction should govern its distribution. This offer was declined. The Baron de

Hirsch Fund is an important branch of Jewish philanthropic work in the United States.

**HISPANIA**, *his' pah' nih ah*, an ancient name applied to Spain. See SPAIN (History: The Three Conquests).

**HISTOLOGY**, *his tol' o jie*, the science which treats of the microscopic study of plant and animal tissues. All living tissues are known to be made up of a very large number of minute cells; all forms of plant and animal life develop from these protoplasmic units. It is the province of histology to examine these cells, study their nature and functions, and interpret the data acquired. Through such research, in which the microscope plays an essential part, botanists have learned the minute structure of roots, stems, and other plant parts, anatomists have ascertained the nature and functions of the nerves, muscles, and other tissues of the human body, and zoologists have traced the development of complex animal organisms from the simplest forms.

**Derivation.** The word histology is from the Greek *histos*, meaning a *tissue*, or *web*, and *logos*, meaning *discourse*.

**Related Subjects.** The reader is referred in these volumes to the following articles:

|         |                           |
|---------|---------------------------|
| Anatomy | Microscope (Some Results) |
| Animal  | Protoplasm                |
| Botany  | Tissue                    |
| Cell    | Zoölogy (Branches)        |

**HISTORIC AGES.** See AGE, subhead.

**HISTORY**, a word derived from a Greek word meaning a *search for knowledge*. Like philosophy, history was originally a branch of research; it meant investigation and inquiry, and the historian was a man who sought the truth. As men began to tell what they had learned, the name *historian* took on a new meaning—it meant the man who recorded or told what he had found; and in the course of time, "history" became story or record. Unfortunately, this meaning is now confused with

another, that history comprises the events themselves, not the record of events. Thus when we say that history is being made every day, we think of the events, not of their record.

What events constitute history? Emerson once said that history "may be resolved into the biographies of a few great men." In a very narrow sense this is true, for great men do influence the course of events. Even the greatest of men, however, have been helped or handicapped by circumstances which they could not control. Men are the actors in history, but just as actors on the stage depend on scenery and other stage effects and are limited by them, so the great figures of history have been limited by nature. There was a time when actors used no scenery, just as there was a time when men were regarded as the sole makers of history.

But to-day the complexity of history is recognized. In the broadest sense, history includes everything that has happened. As modern science shows that everything is constantly changing, the universe and every part of it have a history. In this sense there is a history of the mountains and seas, of plants and animals, and of all the changing things which make up the universe. The more common use of the term, however, restricts it to those things which are directly related to man's activities. Man is interested chiefly in himself, and history is the record of his achievements.

**Divisions of History.** In treating history it has become customary to make an arbitrary division into three periods, ancient, medieval, and modern. *Ancient history* deals with two great groups, the eastern and western civilizations; the East included Egypt, Chaldea, Assyria, Babylonia, the Hebrews and Phoenicians, Persia, and China; the West comprised Greece, Carthage, and Rome. Although a few historians place the end of ancient history in A.D. 814, at the death of Charlemagne, most of them conclude the period with the fall of Rome in A.D. 476. The *medieval period* included approximately 1,000 years, and came to an end, according to some authorities, with the fall of the Byzantine Empire in 1453. The invention of printing and the discovery of America are also sometimes considered as the beginning of the *modern era*. The year 1492 is accepted widely as the opening date in modern history. It is clear that history is continuous, and its division into three periods is merely a convenience. Events of striking importance, such as the fall of an empire or the discovery of the New World, are the signposts at the crossroads.

**History as a Record.** The science of history differs from other sciences, such as mathematics and physics, in that the laws governing the making of history are not fixed and determinable. History deals with all the infinite

and variable influences that affect human life; so history must be classed with sociology, politics, and economics as an inexact science. Students and compilers of history must depend upon certain materials or data for their information, and from those data must weave the fabric of recorded history. Guides to historical records are found in remains such as buildings, implements, and ruins; also in written records of laws and documents relating to government, in art and literature, contemporary narratives, and traditions. From fact, or, sometimes, even theories evolved from facts, the historian endeavors to present a narrative of events in the existence of the nation whose history he is studying.

Viewed thus as research, history is a science, but viewed as a branch of literature, it is an art. The scientific historian defends no theory; he seeks to lay bare the truth. The historian as an artist looks upon his subject as a great picture, whose details must sometimes be subdued in order to make an harmonious whole. Macaulay, for example, occasionally lays himself open to the charge of inaccuracy and prejudice, because he sacrifices truth to rhetoric. From the very first, there have been these two schools of historians, the scientific and the rhetorical. As a science, history flourishes in a scientific age; as an art, it rises and falls with the arts. Those periods which have been influenced by masters of style have been little interested in research. The histories written by Englishmen in the nineteenth century illustrate this point. The first years of the century were characterized by romanticism, with its exaggeration of the individual. Macaulay's *History of England* and Carlyle's *French Revolution* and *Frederick the Great* are consistent with such an attitude; "hero worship" belongs to the age of Scott, Byron, and Keats. The later years of the century were an age of science, of men like Darwin, Spencer, Buckle, and Richard Green. The histories of Macaulay and Carlyle rank as literary masterpieces, but as a record and interpretation they have long been superseded.

It is almost invariably true that historians deal with subjects which interest the age in which they write. Most modern historians began with politics and war; history seemed a continuous march of battles and political intrigue. But as the interest of the people was drawn toward the economic and social factors, these, too, were considered by historians. Histories of industry and commerce are now as common as histories of kings and conquests.

The tendency in historical writing of the present day is to present the results of unbiased research, both in the recording of events and in the presentation of the careers of great men. Historians of the extreme wing of this school believe that it is incumbent on the

writer to tell the undiluted truth, whether or not it removes popular heroes from their pedestals, shatters time-honored legends, and gives a new aspect to events long enveloped with patriotic sentiment. On the other hand, there are educators who believe that considerable discretion should be used in presenting history and biography to children, because their immature minds cannot properly weigh facts of every kind. In some schools in America, histories have been barred from the classrooms because they seemed to lean too far in the direction indicated above.

#### Related Subjects.

The historical articles in these volumes are numerous and extensive, but as they are listed elsewhere it is not necessary to index the most of them here. Each article on a country, state, or province contains a subdivision which treats of its history in general, while in the *Related Subjects* indexes under most of them are listed the specific articles which are of interest in that connection. The following topics have reference to the more general phases of history:

|                           |  |
|---------------------------|--|
| Abdication                | League of Nations                        |
| Archaeology               | Middle Ages                              |
| Balance of Power          | Northwest Passage                        |
| Balkan Wars               | Ordeal and Combat                        |
| Berlin, Congress of       | Pan-American Congress                    |
| Blood, Avenger of         | Pan-American Union                       |
| Charter                   | Peace Conference, International          |
| Chivalry                  | Permanent Court of International Justice |
| Civilization              | Reformation, The                         |
| Colonies and Colonization | Renunciation of War                      |
| Continental System        | Revolution                               |
| Coronation                | Rulers of the World                      |
| Crusades                  | Slavery                                  |
| Dark Ages                 | Succession Wars                          |
| Fifteen Decisive Battles  | Triple Alliance                          |
| French and Indian Wars    | Triple Entente                           |
| Heraldry                  | Vienna, Congress of                      |
| Holy Alliance             | World War                                |
| Inquisition               |  |
| International Relations   |  |

The following historians are given special treatment in these volumes:

|                       |                       |
|-----------------------|-----------------------|
| Abbott, John S. C.    | Grote, George         |
| Bancroft, George      | Guizot, F. P. G.      |
| Bancroft, Hubert Howe | Hallam, Henry         |
| Bede                  | Hart, Albert Bushnell |
| Bryce, James          | Herodotus             |
| Buckle, Henry Thomas  | Holinshed             |
| Caesar, Caius Julius  | Hume, David           |
| Ferrero, Guglielmo    | Josephus, Flavius     |
| Fiske, John           | Lecky, William E. H.  |
| Froissart, Jean       | Livy, Titus           |
| Froude, James Anthony | Lodge, Henry Cabot    |
| Geoffrey of Monmouth  | Lossing, B. J.        |
| Gibbon, Edward        | Macaulay, Thomas B.   |
| Green, John Richard   | McCarthy, Justin      |

McMaster, John B.  
Michelet, Jules  
Mommsen, Theodor  
Motley, John L.  
Nepos, Cornelius  
Parkman, Francis  
Pliny  
Plutarch  
Prescott, William H.  
Ranke, Leopold von

Renan, Ernest  
Ridpath, John C.  
Sallust  
Smith, Goldwin  
Sparks, Jared  
Strabo  
Swinton, William  
Tacitus, Publius Cornelius  
Taine, Hippolyte A.  
Tarbell, Ida M.  
Thiers, Louis Adolphe  
Thucydides  
Thwaites, Reuben Gold  
Van Loon, Hendrik  
Voltaire, Jean  
Xenophon

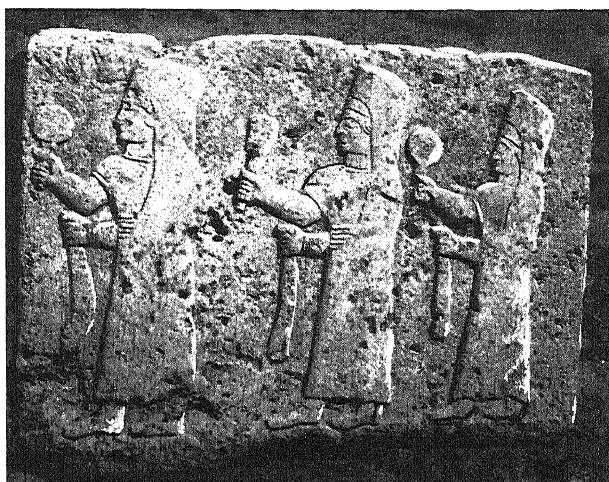


Photo: Du Bois, Beirut, Syria

HITTITE DIGNITARIES  
Sculpture found in ruins in Syria.

**HITTITES**, *hit'-ites*, descendants of Heth, who for centuries occupied the southern part of Canaan, in the neighborhood of Hebron (which see). At a period long before the conquest, Abraham found them there, for it was from a Hittite that he purchased the cave of Machpelah for a tomb when

his wife Sarah died. From Egyptian and Assyrian sources much has been found concerning the powerful influence of the Hittites in early history, but after 400 years of struggle with the Assyrians, they were conquered by Sargon in 717 B.C.

**HIVES**, also called **WHEALS** and **NETTLE RASH**, is a form of skin eruption coming suddenly and disappearing without trace. The patches are red and raised, and itch intolerably. It is the itching which discloses the eruption. People who have hives are unnaturally susceptible toward whatever may be the cause of the disorder. It is an idiosyncrasy disease.

As a rule, the cause is some food toward which the sufferer has an idiosyncrasy. It may be some chemical used in one's occupation. It may be the fur of some animal. Skin tests can be used to discover the substances to which the person is susceptible. To prevent hives, avoid or remove the cause. In some cases, lotions of soda water, witch-hazel, or some other cooling sedative agent may give some relief. See URTICARIA. W.A.E.

**HIVITES**, *hi' vites*, a heathen nation in early Palestine. See CANAANITES.

**HOANG-HO**, a variant of Hwang-Ho, a river of China, now known as Hwang. See CHINA (Physical Features); HWANG.

**HOAR**, *hoar*, GEORGE FRISBIE (1826-1904), an American lawyer and legislator, deeply learned and benevolent, and distinguished for

having served five six-year terms as United States Senator. He was born at Concord, Mass., was graduated from Harvard in 1846, and soon after beginning his legal career, became prominently identified with the Free Soil and Republican parties. In 1852 he was elected to the Massachusetts legislature, and was a member of the United States House of Representatives from 1869 to 1877, when he was chosen United States Senator by his state. He consistently opposed the acquisition of foreign territory by the United States (see IMPERIALISM), and although he supported President McKinley for reelection, he strongly disapproved of the latter's Philippine policy as being contrary to American ideals. In addition to his public offices, Senator Hoar served as regent of the Smithsonian Institution and as president of the American Historical Association.

**HOAR FROST.** See FROST.

**HOARHOUND**, a variant of horehound (which see).

**HOBART**, capital city of Tasmania (which see).

**HOBART COLLEGE.** See NEW YORK (Education).

**HOBBEWA**, *hob' eh mah*, MEINDERT (1638-1709), a Dutch painter, second only to Ruysdael (which see) among the landscape artists of Holland. Little is known of his life. He was born in Amsterdam, and died there in poverty. It is believed, though this is uncertain, that Ruysdael was his teacher. Hobbema's canvases show excellent composition, great finish in detail, and rare handling of sunlight effects. Unlike Ruysdael, who depicted Nature in her tempestuous phases, Hobbema painted quiet landscapes. Only after his death did his works receive proper recognition, and many are now among the prized collections in the leading galleries of America and Europe. The National Gallery, London, possesses his famous *Avenue at Middelharnis* and *Ruins of Breberode Castle*; the museum in Amsterdam has the *Water Mill*; the *Wooded Landscape* is in Berlin.

**HOBES**, *hobz*, JOHN OLIVER, the pen name of Pearl Richards Craigie (which see).

**HOBES**, THOMAS (1588-1679), one of the foremost of English moral and political philosophers. He was the first great English writer who dealt with the science of government from the standpoint of tradition rather

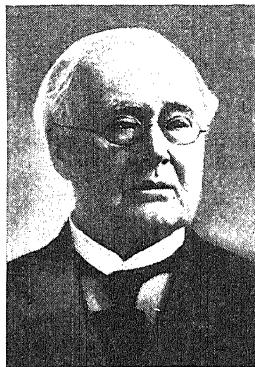


Photo: Brown Bros.

GEORGE F. HOAR

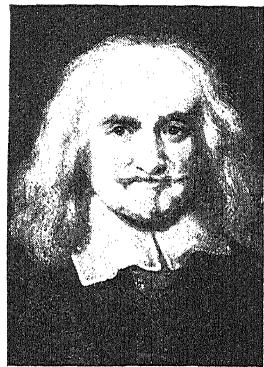


Photo: Brown Bros.

THOMAS HOBBES

than reason. His most famous work, the *Leviathan, or the Matter, Form, and Power of a Commonwealth*, engaged him in almost perpetual controversies, because of its rationalistic criticism and its uncompromising reduction of religion to a department of state. It was condemned by Parliament in 1666, and "Hobbism" became the popular synonym for irreligion and immorality. Although Hobbes was not again permitted to print anything on subjects relating to human conduct, his political theories influenced all later politics. A collected edition of his Latin works was brought out in Amsterdam in 1668. At the age of eighty-seven, he completed an autobiography in Latin verse and a verse translation of the *Iliad* and the *Odyssey*.

**HOBOKEN**, N. J., a city in Hudson County, immediately north of Jersey City, and on the left bank of the Hudson River, opposite New York City, with which it is connected by ferries and tunnels. It lies near the foot of the Palisades of the Hudson River (which see). On Castle Point, a hill 100 feet high, in the northeastern part of the city, is located Stevens Institute of Technology. About one-third of the population is foreign-born, and includes nearly every European nationality, Germans and Italians predominating. Population, 1928, 68,166 (Federal estimate).

**Transportation.** The city is the terminus of several steamship and freight lines, and of the Delaware, Lackawanna & Western Railroad. It has industrial connections with eight other trunk-line railroads, and tube, vehicular-tunnel, and ferry service with New York. There are also interurban and motorbus lines.

**Industries.** A large percentage of the coal consumed in New York is shipped through Hoboken. Among nearly 240 varied industries, the most important are manufactures of foundry and machine-shop products, marine engines, vapor-lighting apparatus, automobile equipment, elevator accessories, willow furniture, leather, drawing and surveying materials, inks, chemicals, silk, and buttons.

**History.** The site of Hoboken in 1630 was called Hobocan Hackinagh (the land of the tobacco pipe), with reference to the pipes carved from native stone by the Indians. Although there were a few previous settlers, the history of the city really began in 1784, when John Stevens, an inventor, bought the land and laid out a town. It was incorporated in 1849 and became a city in 1855. The commission form of government was adopted in 1915.

**HOBSON**, RICHMOND PEARSON (1870- ), an American naval constructor, political leader, and, in his later years, advocate of prohibition of the liquor traffic. He became a popular hero in the Spanish-American War (which see). During the blockade of the Spanish fleet in the harbor of Santiago, Lieutenant Hobson, under Admiral Sampson, conceived the plan of "bottling up" Cervera's fleet and preventing its

from Alabama, serving until 1915. In 1914 he was defeated by Oscar Underwood in his race for nomination as United States Senator. Since then, Hobson has been active as a lecturer and writer in behalf of American naval supremacy, international peace, and world-wide prohibition.

**HOBSON'S CHOICE**, an expression used for a choice when no alternative exists. It

came from the eccentric action of Thomas Hobson (1544-1631), who kept an inn at Cambridge, England. In order to ensure exercise for each of his forty horses, he required every traveler who needed a horse to take the one nearest the door.

**HOCHELAGA**, *ho shel ag'-ah*. See CANADA (History: Age of Discovery and Exploration); MONTREAL (History).

**HOCKEY**, or **SHINNY**, a game played on a level field, usually 100 yards long and 50 yards wide. There are two teams, or opposing sides, each composed of eleven



escape. Accordingly, early on the morning of June 3, 1898, he and seven companions sank the collier *Merrimac* in the entrance of the harbor. Fire from the enemy's guns shot away the gear of the stern anchors, and the ship was swung by the current parallel to the channel instead of across it, but the spectacular daring of the attempt captured the imagination of the American people, and Lieutenant Hobson became the hero of the hour.

He was born at Greensboro, Ala.; in 1889 was graduated from the Naval Academy at Annapolis, and after taking postgraduate work in Paris, entered the United States naval service. In 1897-1898 he organized and conducted at Annapolis a postgraduate course for officers planning to enter the construction corps. After the Spanish-American War, he raised and refitted a number of Spanish warships which had been sunk off the coasts of Cuba and the Philippines. In 1903 he resigned from the navy to enter political life, and in 1906 was elected to Congress as a representative



Photos: U & U

#### A SPORT THAT IS GROWING IN FAVOR

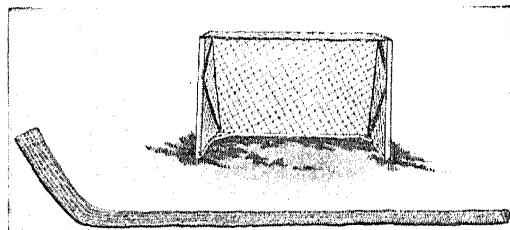
Above, an exciting moment in a game at Saint Moritz, a noted winter resort in Switzerland. Below, members of a school in Washington, D. C. photographed at play.

men. The aim of the game is to drive a ball, by means of a curved stick, through a goal protected by the opposing side. The game is of ancient origin and was played by the Romans. It is only within recent years that a thorough system of rules has been drawn up, for in its modern form hockey dates from about 1875.

The goals are marked at each end of the field with uprights seven feet high and twelve feet apart. An ordinary baseball or cricket ball is used, but it should always be painted white. The stick, called a *hockey* or *hookey*, must not be more than two inches in thickness and must not weigh more than eighteen ounces. A match is played in two periods of thirty or thirty-five minutes each.

To start the game, the ball is placed on the ground in the center of the field, between two center-forwards, who "bully off" the ball into the field. Each center strikes the ground and his opponent's stick alternately three times; then either may strike the ball. A goal is scored when the ball is driven into the opponents' goal, the side scoring the greatest number of goals being the winner. There are numerous rules to cover the plays, but hockey is often played by boys without reference to definite rules.

**Ice Hockey.** This is a more popular game than field hockey in all countries where there is much ice. The players are on skates on a field of ice, and as the game calls for great



HOCKEY GOAL AND STICK

skill, only the most expert skaters can excel. The rules vary only slightly from those governing field hockey.

The ice rink must be at least 112 feet long by 58 feet wide. The sticks are a little larger than those used in field hockey, but must not be more than three inches wide in any part. In 1881 rules were drawn up by clubs in Montreal, and the game soon became one of the most popular of winter sports in Canada and the northern part of the United States. There are established amateur hockey leagues in the United States and Canada. This game is played very little in England, as many winters pass without ice available for skating.

**HODEIDA**, *ho deh' e dah*. See YEMEN.

**HODER**, *ho' dur*. See MYTHOLOGY (The Death of Balder).

**HOE, RICHARD MARCH** (1812-1886), an American inventor whose ingenuity made possible the metropolitan daily newspaper of many pages. He was born in New York City, and lived there all his life. In 1846 he invented a rotary printing press, commonly known as Hoe's Lightning Press. Later he patented the

web perfecting press, which printed both sides of the sheet in one operation, at the rate of 12,000 copies an hour, and included a cutting and folding device. This invention marked an epoch in newspaper-printing. It has been improved until Hoe presses of largest size now print, cut, paste, fold, and deliver in neat piles 96,000 16-page papers per hour. See PRINTING PRESS.

**HOFER, ANDREAS** (1767-1810), a patriot of the Tyrol, born at Saint Leonhard. In 1796 he led a rifle company against the French at Lake Garda, and after the Peace of

Luneville, was instrumental in organizing the Tyrol militia. As the leader of the insurrection of 1809, he defeated the French and Bavarian troops and liberated the greater part of his country. He afterward held important public offices. Following the Treaty of Schönbrunn, in 1809, the French and Bavarians again invaded Tyrol; Hofer was betrayed into the hands of his enemies, was conveyed to Mantua, tried by court-martial, and shot by order of Napoleon.

**HOFFMAN, TALES OF.** See OPERA (Some of the Famous Operas).

**HOFFMANN, HEINRICH** (1824-1902), a German painter who excelled in Scriptural subjects, though for many of his canvases he drew upon literature and mythology. He was born in Darmstadt, studied in Düsseldorf and Antwerp, and in 1862 settled in Dresden, where he became professor of art in an academy. His pictures are prized for the ideality of his conceptions of the events which they portray. See PAINTING (Other Nations).

**Hofmann's Canvases.** Among the best of his Biblical portrayals are *Christ in the Temple*, *Christ Taken Prisoner*, and *Christ's Sermon on Lake Gennsaret*. The ceiling of the Dresden Theater contains his magnificent *Apotheosis of the Heroes of the Greek Drama*.

**HOFFMANN, JOSEF** (1877- ), a Polish pianist and composer, born at Cracow. The lad studied with his father and later with Rubinstein. He started on a public career at the age of six, and began a successful concert tour of Europe when nine years old. Then he visited America, and in two and a half months appeared in fifty-two concerts, which aroused the indignation of the Society for the Prevention of Cruelty to Children, for the

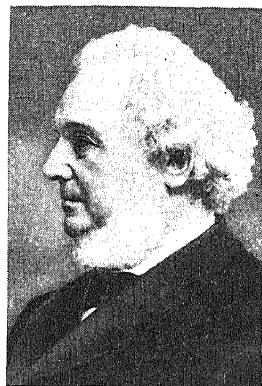


Photo: Brown Bros.

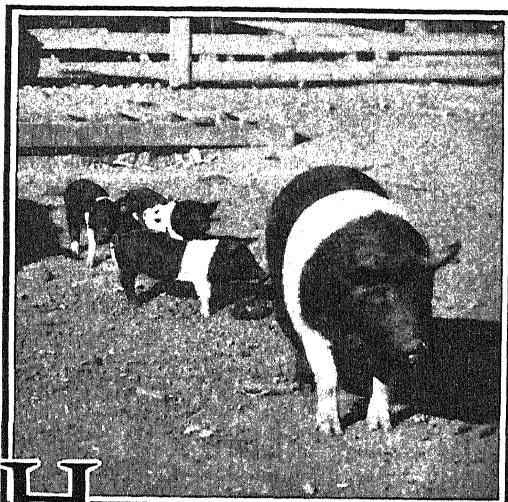
RICHARD HOE

boy was breaking down under the strain. He did not again appear in public until 1894, when he played in Dresden; he has since made successful tours of America and the Continent. He also holds the position of director and instructor of piano in the Curtis Institute of Music, Philadelphia. Hofmann, who composes also for the piano, is classed with a group of pianists who "concern themselves with the orchestral development of piano tone." He has written various articles on musical topics for American magazines.



Photo: Brown Bros.

JOSEF HOFMANN



**H**OOG, also known as SWINE, a clumsy, thick-skinned descendant of the wild boar, which under domestication has become a most useful and valuable farm animal. Its flesh is one of the most widely used foods of mankind, and its fat, hide, and bristles are likewise of commercial value. The hog has a thick neck, which is in a direct line with the trunk and which ends in a head tapering off into a short, pointed snout. Its feet have four horny, separately hoofed toes, two of which in the domestic animal have atrophied and no longer touch the ground. Often the hog is dirty white or a dull yellow in color, but brown, black, and black-spotted hogs are common. Hogs will eat almost anything, though in the domesticated state their food is chiefly vegetable. As a farm animal raised for food, hogs are found in almost every part

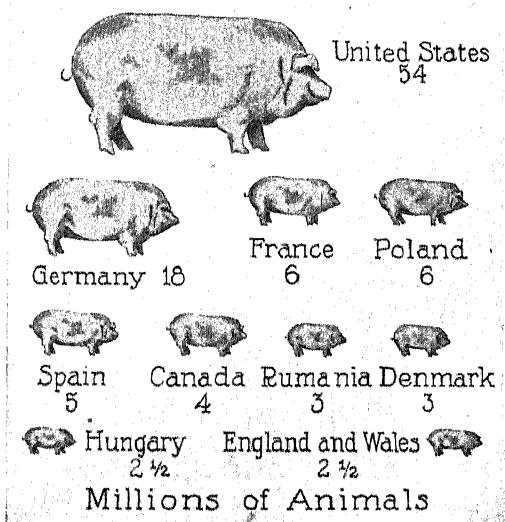
of Europe and America, and tame swine have been found by discoverers in previously unexplored territory in the South Seas.

The term *boar* is applied to the adult male hog, and *sow* to the female. Before being weaned, the young are called *pigs*; after weaning, they are known as *shoats* or *shotes*.

Pigs are born in litters, that is, a number at a time, each litter usually consisting of from four to ten pigs, although as many as fourteen have been reported.

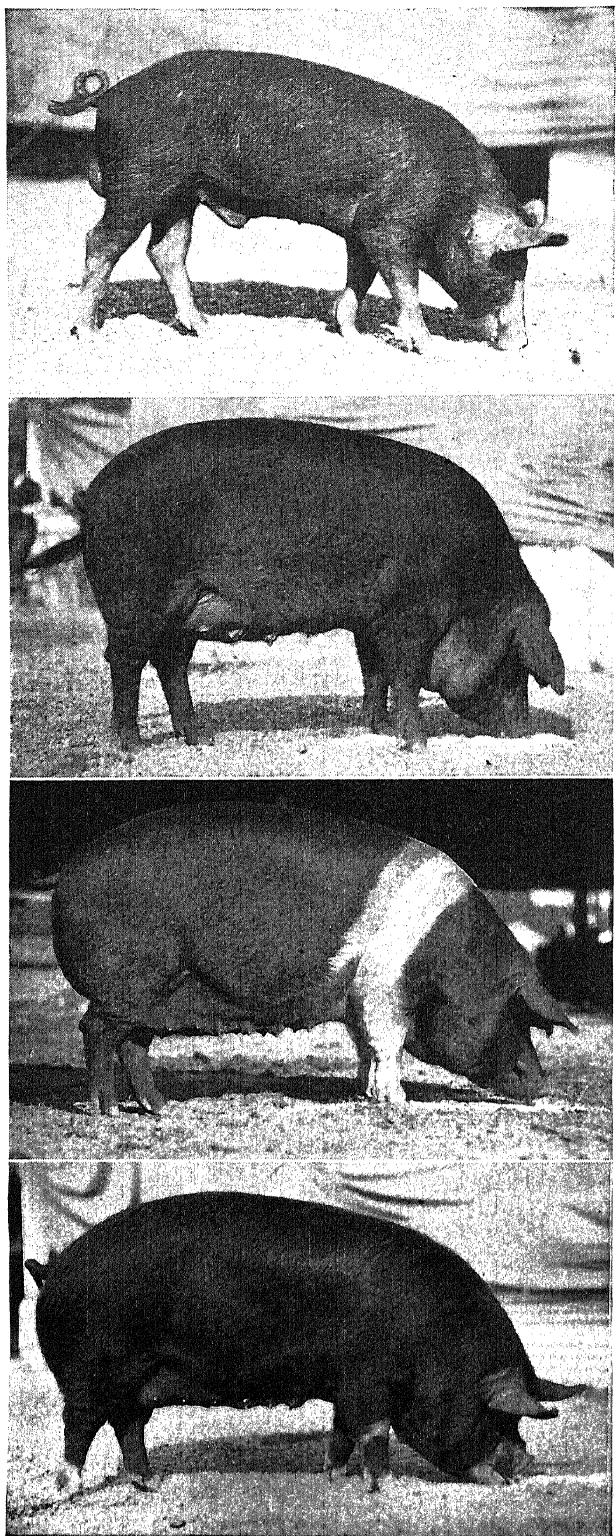
Hogs are unfairly charged with being dirty in their habits. It is true that they do wallow in mud, but all pachyderms, or thick-skinned animals, do this, because only mud or some similar substance is cool enough to penetrate their tough skins. Actually, hogs thrive and breed better in clean quarters. The up-to-date farmer is as careful to keep the pigsty clean as to insist on cleanliness in the stable, and to supply his hogs with fresh water and with food somewhat better than the refuse of the farm.

Many varieties of meat are hog products; bacon and hams are possibly the commonest forms, and these are in greatest demand for exportation. Bacon and salt pork, in particular, are staple articles of diet in all military camps, for salt meat keeps for a longer time than the fresh varieties. In spite of the fact that some religions, as the Jewish and Mohammedan, prohibit the use of pork, a great pro-



**COUNTRIES WITH THE MOST SWINE**  
The table indicates the condition prevailing for an average of three years.

portion of the world's meat is supplied from the hog industry. On account of the hog's habits of living, its flesh is liable to contain cysts of certain parasitic worms, especially the trichina, which when taken into the human



Photos: Cook &amp; Gormley

system may cause serious maladies. Besides the meat, the thick layer of fat under the skin is tried out and refined for lard; the bristles are used in the manufacture of brushes; and the skin makes a very tough, durable leather. Other by-products include hair for mattresses, grease, oil, sausages casings, glue, and fertilizer.

In the United States, the Mississippi Valley is the chief hog-producing region.

The most important breeds of hogs are the Berkshire, Cheshire, Chester White, Duroc-Jersey, Hampshire, Poland China, Spotted Poland China, Tamworth, and Yorkshire. W.H.N.

[Other illustrations, pages 3193 and 3194.]

**Scientific Name.** Hogs belong to the family *Suidae*. The common European hog, from which domestic breeds are descended, is *Sus scrofa*.

**Related Subjects.** The reader is referred in these volumes to the following articles:

|              |     |      |
|--------------|-----|------|
| Bacon        | Fat | Lard |
| Cold Storage | Ham | Pork |

**HOGARTH, ho' gahrth,** WILLIAM (1697-1764), a famous English painter and engraver who is called "the Molière of painting" because of his ability to tell a story on canvas with sharp satire and extraordinary realism. He was born in London. At the age of seventeen, he became a silversmith's apprentice, learned to make designs for plates, and in 1718 set up a shop of his own. He early became known as a successful designer and engraver; his engravings entitled *Masquerades and Operas* and his illustrations for Butler's *Hudibras* won him a reputation long before his talents as a painter were recognized. In the latter field, he stirred up much controversy because he refused to imitate or worship the old masters, as was the custom of his day. He insisted on painting from nature, instead of relying on the past. The estimate of time is that he is England's greatest pictorial satirist and a painter of high order.

**Most Important Paintings.** Hogarth's first important series of satirical pictures is entitled *The Harlot's Progress*. It was followed by *A Rake's Progress* and, in 1745, by his most celebrated satire on canvas, *Marriage à la Mode*. The original paintings of this series are in the National Gal-

#### SOME FINE SPECIMENS

From top to bottom: Tamworth boar; Duroc Jersey sow; Hampshire sow; Berkshire sow.

lery. Thousands became familiar with these stories in oil through the prints he made from engravings. As a portrait painter, Hogarth showed wonderful technique, and his portrait of himself, with his dog Trump; his *David Garrick* (as Richard III); his *Peg Woffington* (Metropolitan Museum), and others rank with the best in English portraiture.

**HOGBACK MOUNTAIN.** See NEBRASKA (The Land).

**HOGCHOKER.** See SOLE.

**HOG ISLAND.** See PHILADELPHIA, PA.

**HOGNOSE SNAKE.** See ADDER.

**HOGSHEAD,** *hogz' hed*, a large barrel or cask for holding various substances, its unit of capacity varying with the contents. In the United States it is equivalent to sixty-three American gallons, or 52.485 imperial gallons. For tobacco, its weight varies from 750 pounds to 1,200 pounds in the different states. In 1483 a statute enacted by Richard III fixed the hogshead of wine at sixty-three wine gallons or 52½ imperial gallons. The London hogshead of ale was forty-eight ale gallons. The hogshead is little used in modern measurement.

**Derivation.** The term *hogshead* probably arose from the fact that the head of an ox was branded on the cask and the name was rightfully *ox head*, being corrupted into the present form.

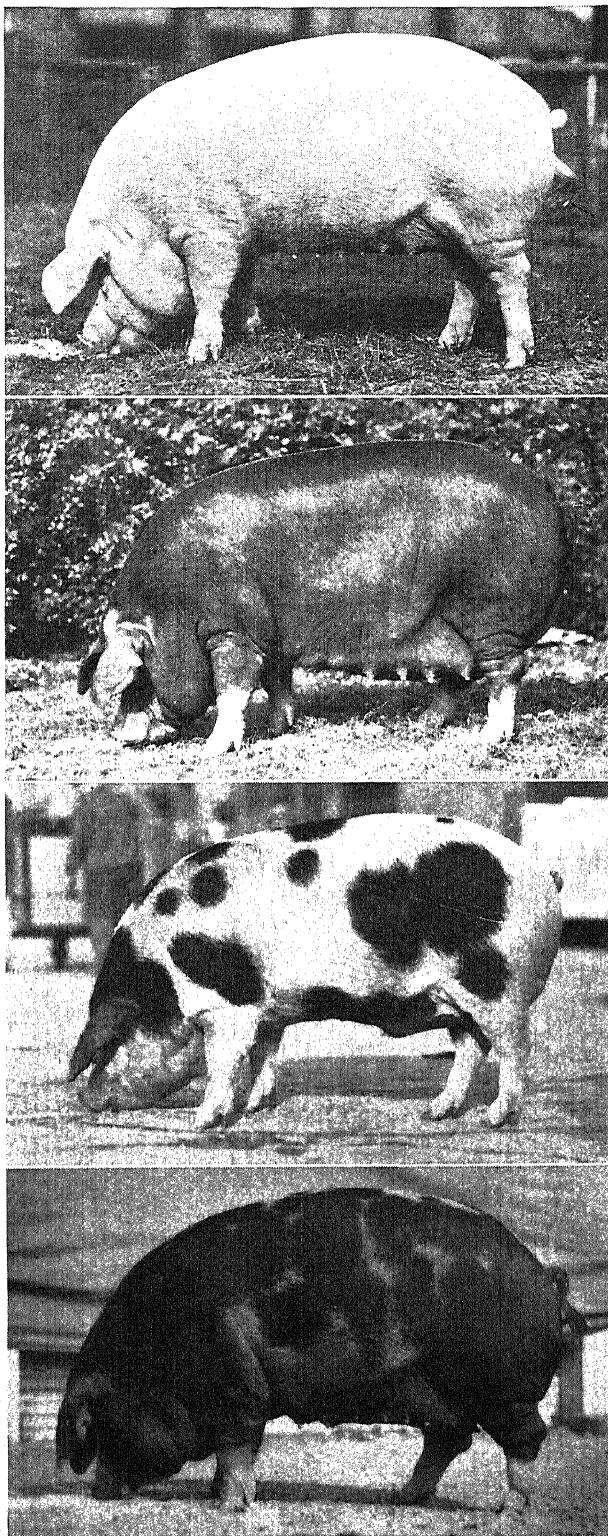
**HOGUES HILL.** See OHIO (Physical Features).

**HOGWEED.** See RAGWEED.

**HOHENSTAUFEN,** *ho en sh'tou-fen*, a princely family which held possession of the German imperial throne from 1138 to 1254. It descended from Frederick of Buren, who lived in the second half of the eleventh century, and whose son, Frederick of Stauffen, built the castle from which the dynasty derived its name; some remains of this castle are still to be seen. Beginning with Conrad III, who succeeded Lothair of Saxony, the House of Hohenstaufen furnished many German rulers, including Frederick I, Henry VI, Otho IV, Frederick II, and Conraddin, the last of the line, whose execution in 1254 ended the Hohenstaufen rule. The emperors of this dynasty rank among the ablest

#### OTHERS EQUALLY NOTABLE

From top to bottom: Chester White sow; Poland China sow; Poland China barrow; Spotted Poland China sow.



Photos: Cook & Gurnley



Photo: Cook &amp; Gormley

See article HOHENZOLLERN.

rulers of Germany; their fame rests upon their political greatness, their success as organizers, and the encouragement they gave to science, art, commerce, and trade. See GERMANY (History: Conflict with the Papacy).

**HOHENZOLLERN**, *ho en tsohl' urn*, for centuries the family name of the royal house of Prussia, which descended in unbroken line to the last king of Prussia and emperor of Germany, in the person of William II. The name is derived from the ancestral castle Zollern, or Hohenzollern, in Swabia. The origin of the house is obscure, the story of its supposed descent from one Count Thassilo being legendary. From a petty princely family in the beginning of the twelfth century, it developed into a powerful dynasty, and continued without interruption to the year 1918 to rule over Brandenburg, furnishing Prussia with its kings since 1701, and Germany with its three emperors from the foundation of the empire in 1871 to William's abdication in 1918. The history of the Hohenzollern family from the fifteenth century is that of Brandenburg, Prussia, and Germany.

[See BRANDENBURG; PRUSSIA; GERMANY; also WILLIAM (II, Germany).]

**H O H E N Z O L -  
L E R N C A N A L.** See CANAL (Canals of Europe); ODER RIVER.

**HOLBEIN**, *hohl'-  
bine*, the name of a family of celebrated German painters who lived at Augsburg and Basel from the close of the fifteenth century to the middle of the sixteenth.

**Hans Holbein**, the Elder (1460-1524), is best known for his *The Basilica of Saint Paul* and a *Passion*, in eleven pieces, now in the Augsburg gallery. Little is known of his life, but he left many works which prove



HOLBEIN THE YOUNGER

A portrait by himself.

his skill. His style is founded on the models of the early Flemish school, although his later works show traces of Italian influence. Among the best known of the latter are *Life of Saint Paul*, *Martyrdom of Saint Sebastian*, and *Fountain of Life*.

**Hans Holbein**, the Younger (1497-1543), is seen at his best in a great series of portraits of the most emi-



"PORTRAIT OF A YOUNG MAN"

A specimen of the art of Holbein the Younger.

nent Englishmen of his time. In early youth he was taught by his father. Later, he spent much time in Basel, where he devoted himself to religious pictures. To this period belong his famous *Madonna and Child with Saint Ursus* and *Saint Martin of Tours* and his *Madonna of the Burgomaster Meyer*. Here he also designed twenty alphabets of richly ornamental letters and over 300 woodcuts; his notable series of *The Dance of Death* and the *Old Testament Cuts* were not issued until some time later. In 1526 he went to

England, and while there presented letters of introduction from Erasmus to Sir Thomas More, who was in high favor with Henry VIII. This introduction paved the way later to Holbein's appointment as painter to the king. In this capacity he executed many fine portraits of royal personages, both in England and on the Continent.

**HOLBERG**, LUDWIG, founder of Danish literature. See DENMARK (Literature and Art).

**HOLDEN**, EDWARD SINGLETON (1846-1914), an American astronomer, who as director of Lick Observatory rendered important service to astronomical science. He was born at Saint Louis, Mo., was graduated from Washington University in that city in 1866, and from the United States Military Academy in 1870. Holden was professor of mathematics at the Naval Academy from 1873 to 1881, and director of the Washburn Observatory at Madison, Wis., from 1881 to 1885. From the latter year to 1887, he was president of the University of California, and from 1888 to 1898, director of the Lick Observatory at San Jose, Cal. From 1901 to the end of his life, he was librarian of the United States Military Academy at West Point.

**Writings.** His publications include *Index Catalogue of Nebulae*, *Essays in Astronomy*, and *Mountain Observatories*.

**HOLDING CORPORATION.** See TRUST.

**HOLIDAY.** The word holiday, which comes from the Anglo-Saxon *halig daeg*, meaning *holy day*, was applied originally to any festal day which was set apart for religious observance. It was intended to commemorate some sacred event or to honor the memory of some holy person. The term is now applied to any day on which people lay aside ordinary duties and cares. The religious holidays will be found treated in the article FESTIVALS.

In the United States, Sunday is the only day which is recognized in common law as a day set apart for cessation from labor. Congress has at various times designated special holidays, as the Day of Rejoicing after the close of the War of Secession, but the American people have no national holiday which is definitely set apart by a law of Congress. Even July 4 is not a holiday by authority of the United States. The various states, and the non-contiguous territories, however, appoint certain legal holidays. In nearly all of them, New Year's Day (January 1), Washington's Birthday (February 22), Independence Day (July 4), Labor Day (first Monday in September), Thanksgiving Day (the last Thursday in November), and Christmas Day (December 25) are designated as legal holidays.

In the North, the thirtieth of May is observed as Memorial Day. Most of the Southern states celebrate Confederate Memorial

Day on April 26, but May 10 is the date observed by North and South Carolina, and in Louisiana, June 3, Jefferson Davis's birthday, is honored. The birthday of Robert E. Lee, January 19, and that of Davis are legal holidays in several of the states of the South, and February 12 is a holiday in many states, in honor of Lincoln's birthday. Arbor Day, Bird Day, Columbus Day, and Flag Day are celebrated more particularly as school holidays. Most of the states set apart General Election Day, the first Tuesday after the first Monday in November, every four years, when Presidential electors are chosen. Armistice Day, November 11, is a legal holiday in about half the states. Good Friday is usually a school holiday.

The public holidays set apart by statute in the Dominion of Canada are as follows: Sunday, New Year's Day, Christmas Day, Empire Day (May 24), Dominion Day (July 1), and Labor Day (the first Monday in September). In the province of Quebec, certain feast days of the Church are likewise legal holidays.

**Related Subjects.** For other days observed, at least as semi-holidays, see special departments under the various months of the year. See, also, ARBOR DAY, BIRD (Bird Day); FLAG.

**HOLINSHED**, *hol' inz hed*, RAPHAEL, or RALPH ( ? -1580), an English writer, born at Sulton Downes, Cheshire, and believed to have been educated at Cambridge. He is known only by his *Chronicles of England, Scotland, and Ireland*, but these rank high in importance. The first edition of this famous work was published in London in 1577. It is known as the "Shakespeare edition," because it is the one the poet is believed to have used in collecting material for his historical plays. In the preparation of the work, Holinshead is said to have been assisted by some of the ablest scholars of the day. See SHAKESPEARE, WILLIAM.

**HOLLAND**, the popular name of the country which officially is the Netherlands. See NETHERLANDS, THE.

**HOLLAND**, a cloth. See BLEACHING.

**HOLLAND**, JOHN PHILIP (1842-1914), an Irish-American inventor who first proved the practicability of submarine navigation. Holland was not an engineer or an inventor by profession; he perfected the submarine for a definite purpose, namely, the destruction of England's sea power. Born in Ireland, he spent his boyhood in a riot of absentee landlordism, evictions, and disturbances of every kind, and learned to view England with hatred. He wanted to free Ireland from English rule, and to do this, he realized, England's power on the seas would first have to be destroyed.

It was in 1862, while teaching in a Christian Brothers' school in Cork, Ireland, that the battle between the *Monitor* and the *Merrimac*

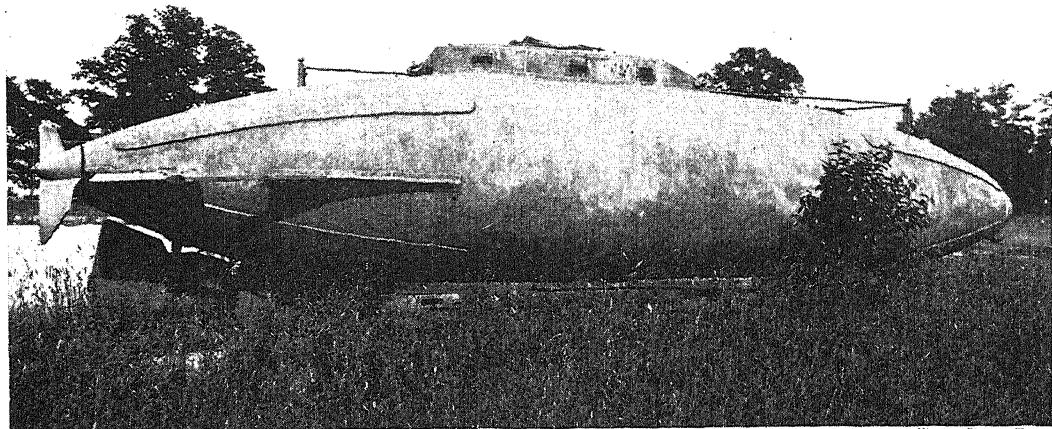


Photo: Brown Bros.

HOLLAND'S FIRST SUBMARINE

gave Holland a call to what he conceived to be his duty. The victory of the ironclad ship, he saw, foretold England's dominion on the sea, unless some new opposing weapon could be found. Working alone in his little room in the monastery at Cork, he solved the problem to his own satisfaction, but was laughed at for his "crazy notions." A year or two later, he went to the United States, where he continued his experiments, at the same time supporting himself by teaching school. He himself was not a Fenian, but he built a submarine which the Fenians paid for and intended to use.

When the Fenian excitement died out, and the possibility of war between England and the United States was ended by the arbitration of the *Alabama* claims, Holland and his submarine dropped from public notice. Not for twenty years, until 1895, did he appear again. In that year, the United States government advertised for bids for a submarine to be built at its expense, and Holland was given the contract. For a large part of the time during which the boat was under construction, Holland was too ill to superintend the work, and it was left to various government officials, who materially changed the plans. When the *Plunger*, as it was called, was finished, it was so faulty that Holland, in disgust, refused to allow the government to keep it, and he refunded \$95,000, the sum which had been paid him.

In 1898 he built another submarine, the *Holland*, this time without interference; it was only fifty feet long and carried only one torpedo tube, but in every essential feature it has been the model on which nearly all submarines have since been constructed. In later years, Holland experimented unsuccessfully

with airplanes. He met serious financial reverses, and died in poverty. See *SUBMARINE*.

**HOLLAND, JOSIAH GILBERT** (1819-1881), an American editor and novelist, who published his early writings under the name of *Timothy Titcomb*. Holland was born in Belchertown, Mass., was graduated from Berkshire Medical College in 1844, and established himself as a physician at Springfield, but was unsuccessful in gaining a practice. Subsequently, he became superintendent of schools at Vicksburg, Miss. In 1849 he was assistant editor of the *Springfield Republican*, and after 1851 part owner of that journal. He was one of the founders of *Scribner's Monthly*, which was started in 1870, this periodical becoming the *Century Magazine* in 1881 under another ownership. His *Timothy Titcomb* letters were attractive for their vivacious style and high moral tone. His novels and poems, which were popular include *Seven Oaks*, *Arthur Bonnicastle*, *Nicholas Minturn*, *Garnered Sheaves*, *Bittersweet*, and *Kathrina*.

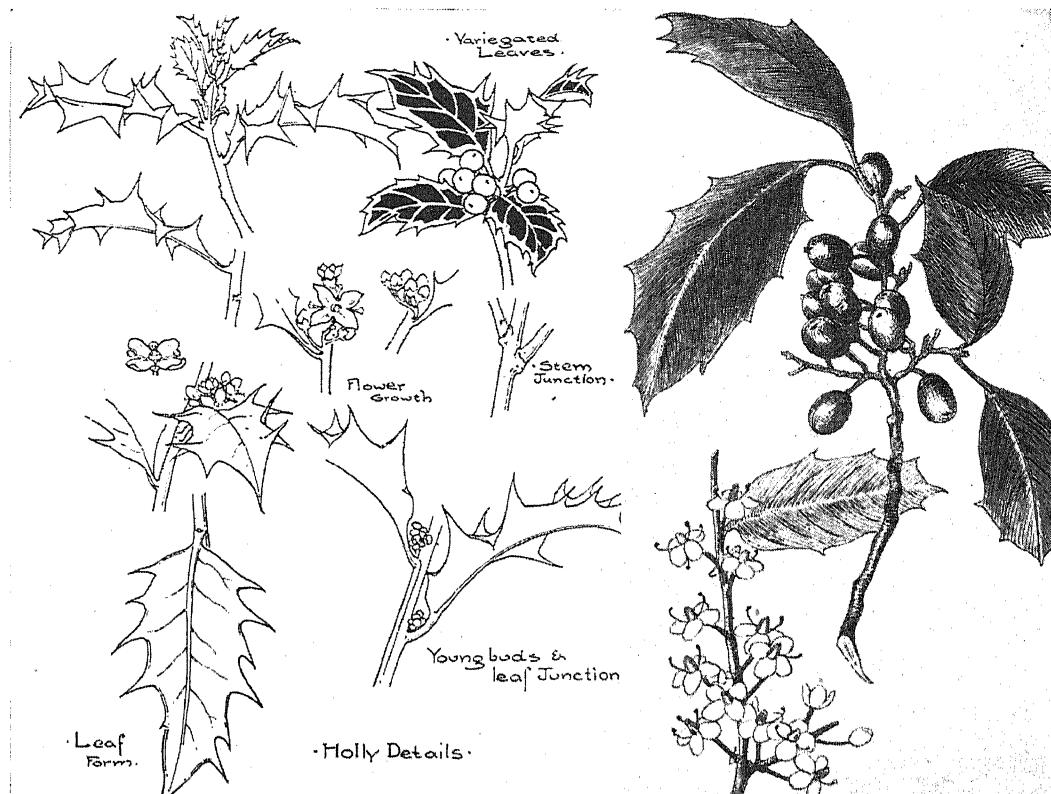
**HOLLAND, MICH.** See *MICHIGAN* (back of map).

**HOLLEY, MARIETTA** (1850-1926), a favorite writer of fiction which was highly enjoyed by the generation that is now passing. Her most popular works were humorous delineations of everyday people, foremost among



Photo: Brown Bros.

JOSIAH G. HOLLAND



HOLLY, AND DETAILS OF STRUCTURE

whom was "Samantha," otherwise "Josiah Allen's wife." The author was born on a farm near Adams, N. Y., and as early as her sixteenth year, began writing short stories. When she began to develop the "Samantha" tales, her fame spread throughout the country.

**Her Books.** Around the rural character, "Josiah Allen's wife," she wove the stories of *Samantha at Saratoga*, *My Wayward Partner*, *Samantha Amongst the Brethren*, *Samantha Amongst the Colored Folks*, *Samantha at the World's Fair*, *Samantha in Europe*, *Around the World with Josiah Allen's Wife*, *Samantha at the Saint Louis Exposition*, *The Borrowed Automobile*, *Samantha on Children's Rights*, *Who Was to Blame? Samantha at Coney Island and One Thousand More Islands*, *Samantha on Women's Rights*, and *Josiah Allen on Women's Rights*. The first book named was issued in 1877; the last, in 1914.

**HOLLOW RELIEF.** See RELIEF.

**HOLLY.** Holly wreaths are everywhere used for Christmas decorations, and the cheerful red berries of this plant, mingled with the shining dark-green leaves, seem made especially for the Yuletide. In olden times, the plant was called *holly tree*, from its use in houses and churches at Christmas time, and *holly* is probably a corruption of that name. The various

species constitute a genus of evergreen trees and shrubs that grow in temperate climates in most parts of the world. The common American species is a small cone-shaped tree with less brilliant leaves and berries than the European holly; it is, nevertheless, a most attractive tree and is worthy of a place in shrubberies, though it grows but slowly. It is found in many of the states from Maine to Texas, attaining its greatest height, of about fifty feet, in the bottom lands of Eastern Texas and Southern Arkansas.

The European holly is a favorite ornamental in Great Britain, and is sometimes planted in hedges. With that other hedge plant, the hawthorn, the holly helps to transform the English countryside into a white sea of beauty in May, for the flowers of both plants open in this month.

The exceedingly hard, close-grained wood of the holly is valued for musical instruments, interiors, and furniture. The inner bark yields birdlime. The leaves of a South American species of holly are used in the preparation of a tea-like beverage called *mate* (which see).

**G.M.S.**  
**Scientific Names.** The holly genus is known botanically as *Ilex*, and is placed in the family *Aqui-*

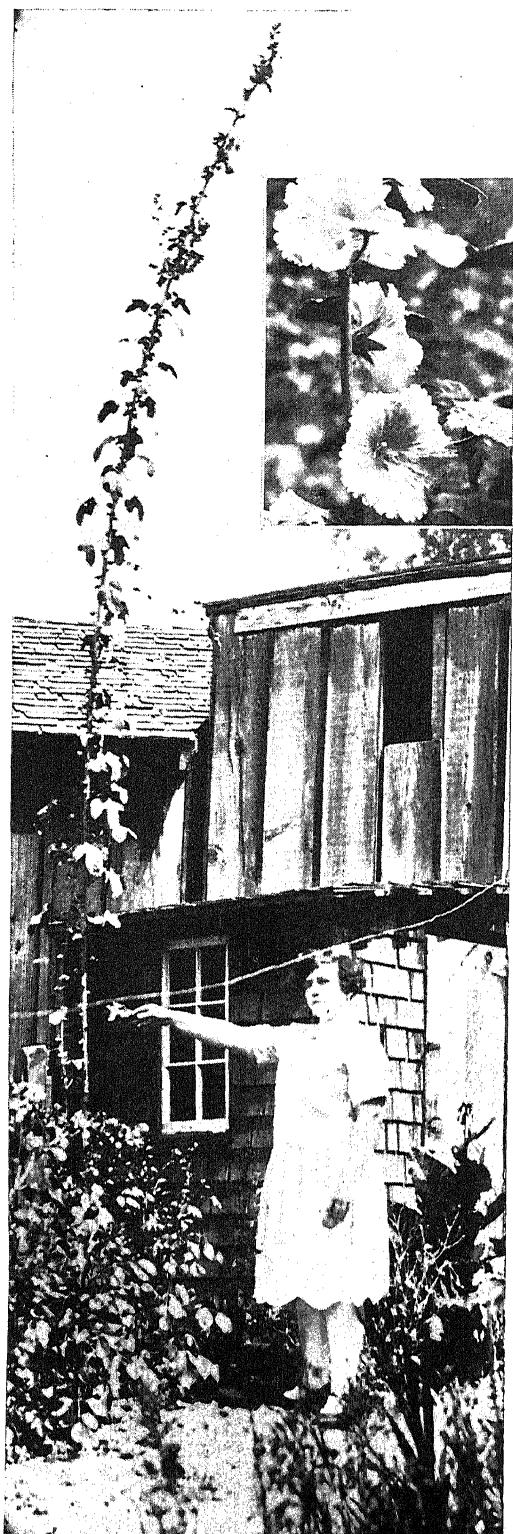


Photo: P &amp; A



*foliaceae*. The common American species is *Ilex opaca*. The European holly is *I. aquifolium*.

**HOLLY, DECIDUOUS.** See WINTERBERRY.

**HOLLYHOCK**, a hardy plant of the mallow family (see MALLOW), cultivated in many different countries for its large, handsome blooms, which may be either single or double. These grow on tall flower stalks, and are seen in many lovely hues, from white through shades of red to purple. There is no better garden flower than the hollyhock for borders, fence growths, or dooryards. Plants sown from seed usually bloom the second year (see BIENNIALS), but annual hollyhocks are featured by some florists. The hollyhock is native to India and Southern Europe. B.M.D.

**Scientific Name.** The hollyhock belongs to the family *Malvaceae*. Its botanical name is *Althaea rosea*.

**HOLLYWOOD, CALIF.** See LOS ANGELES, CALIF.

**HOLMES, hohmz**, ELIAS BURTON (1870- ), an American traveler widely known for his illustrated lectures, or "Travelogues," was born and educated in Chicago. When a boy he became interested in photography and devoted much time to making pictures of his early travels in the United States, Mexico, and Cuba. At the age of sixteen, he made his first European tour. His first lecture, *Through Europe with a Camera*, was given before the Chicago Camera Club in 1890.

Three years later (1893), he made his first professional appearance. His lectures immediately won popularity, and each year he gives courses in the largest cities of the United States, presenting new subjects each season. Mr. Holmes devotes six or eight months each year to travel. His lectures have been published in a series of illustrated volumes under the title *Burton Holmes Travelogues*.

**HOLMES, MARY JANE** (1839-1907), an amazingly popular novelist of a past generation, whose works are yet read by those sentimentally inclined. Her most popular book was *Tempest and Sunshine*. More than two million copies of her books were sold before her death.



Photo: U &amp; U

E. BURTON HOLMES

#### AN EIGHTEEN-FOOT HOLLYHOCK

The lady in the picture, at her home in Piedmont, Calif., challenges the world to produce a taller one. The insert shows detail of the hollyhock blossoms.



**H**OLMES, OLIVER WENDELL (1809-1894). In his *Fable for Critics*, James Russell Lowell wrote in his sharpest, cleverest vein:

There's Holmes, who is matchless among you for wit;  
A Leyden jar always full charged, from which flit  
The electrical tingles of hit after hit;

and to this day most people think of Holmes with a smile, remembering the merriment written into his *Autocrat* and such of his poems as *The Height of the Ridiculous*, *The Specter Pig*, and *The Hot Season*. But Oliver Wendell Holmes was more than a humorist. He was a physician of note in his day, and the writer of medical treatises which were of value to his generation; he was a teacher so inspiring that he was given the last hour in the college day for his classes, because he alone could enliven the fagged brains; he was a novelist, though not a great one; and above all else, he perfected a certain style of literature, which in reality was but printed conversation. To his unusual abilities were joined a manner of rare charm and a genuine kindness and love for humanity, and it is not strange that he should have been one of the most popular men of his day.

**Years of Preparation.** Holmes was born on August 29, 1809, at Cambridge, Mass., the son of a Congregational minister. The family life was pleasant; he had access to a library and read "in books rather than through them." Thus he came to young manhood with the idea that the world is a delightful place. After graduation from Harvard in 1829, he began to study law, but soon gave it up for medicine. Meanwhile, his name was on men's lips all over the country. In 1830 he heard that the famous ship *Constitution* was to be destroyed, and he wrote the stirring *Old Ironsides*—

Ay, tear her shattered ensign down!  
Long has it waved on high,  
And many an eye has danced to see  
That banner in the sky.

The verses were copied and recopied, and so strong was the popular protest which they voiced that the old ship was saved.

In 1833 Holmes went to Europe to continue his medical studies, and on his return, three years later, settled down to begin his professional career in Boston. People refused to consider him seriously as a physician, and hesitated to trust their lives to a "frivolous-

minded" young poet. Partly due to this attitude and also because he could not endure to witness the constant suffering and misery with which his work brought him in contact, he gave it up in 1838 and became professor of anatomy at Dartmouth. Two years later, he married Amelia Lee Jackson, with whom he lived a peculiarly happy life. For a time he resumed his practice in Boston, but in 1847 he resigned

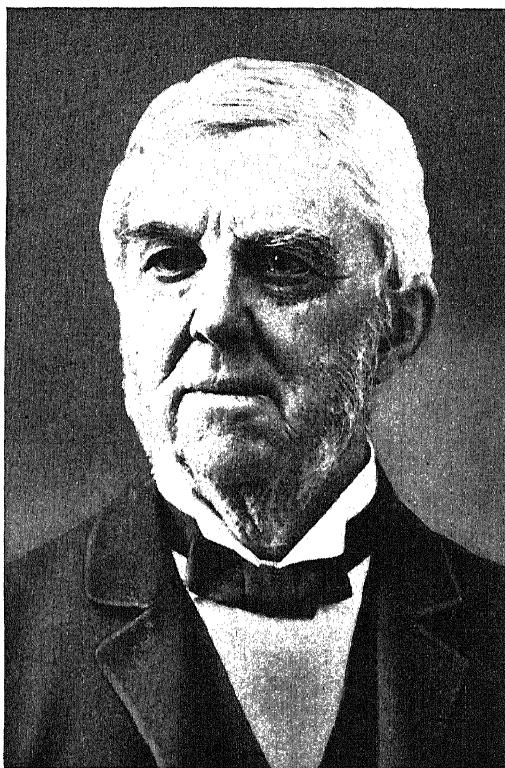


Photo: Brown Bros.

OLIVER WENDELL HOLMES

to become dean and professor of anatomy at Harvard Medical School, a post he held for thirty-five years. "It's not," he wrote when he first discovered the multiplicity of his duties—"a chair which I've been called to occupy; it's a settee."

**Years of Achievement.** Hand in hand with wonderful success as a lecturer, Holmes developed a growing literary reputation. For a

time this was purely local, and no important occasion in Boston, that beloved city which he called "the hub of the universe," was complete without his presence and his verses.

In 1857, with the founding of the *Atlantic Monthly*, Holmes became famous at home and abroad, for to it he contributed those talks, wise, witty, and philosophical, which make up the *Autocrat of the Breakfast Table* (which see). Holmes's friends knew how brilliant a conver-



BIRTHPLACE, AT CAMBRIDGE

sationalist he was—"the best talker in Boston"—and now the world had a chance to discover this. *The Professor at the Breakfast Table* and *The Poet at the Breakfast Table* followed, with almost as great success. Three novels, *Elsie Venner*, *The Guardian Angel*, and *A Mortal Antipathy*, introduced people to some of those problems of psychology and of heredity which so deeply interested the author.

In 1886 Holmes visited England, where he was received with the utmost enthusiasm. People could not pay honor enough to the sprightly little old man whose acquaintance they had made in the whimsical *Breakfast-Table* series. After his return home, he wrote *Our Hundred Days in Europe* and one more set of autocrat papers, called *Over the Teacups*. Regarding these, one critic said, "Sunset lights fall upon the tea table, where a poem always waits, tucked into the silver sugar-bowl, but there is no abatement of the old-time mirth and kind sagacity." Death was as kindly to Holmes as life had been, for he died in his chair, without struggle or suffering, on October 8, 1894.

Among Holmes's best poems may be mentioned the amusing yet pathetic *Last Leaf*; the much-declaimed *Wonderful One-Hoss Shay*; and the captivating *Dorothy Q.* Probably the most quoted lines from all his works are the last of *The Chambered Nautilus*, his own favorite:

Build thee more stately mansions, O my soul,  
As the swift seasons roll!  
Leave thy low-vaulted past!

Let each new temple, nobler than the last,  
Shut thee from heaven with a dome more vast,  
Till thou at length art free,  
Leaving thine outgrown shell by life's unresting  
sea!

**HOLMES, OLIVER WENDELL, JR. (1841—)**, an American jurist and Associate Justice of the United States Supreme Court, is the son of Oliver Wendell Holmes, the essayist and poet.

He was born in Boston, was graduated from Harvard College in 1861, and from the Harvard Law School in 1866. In the War of Secession, he entered the Twentieth Massachusetts Volunteers and served three years, receiving brevets as major and colonel. He was wounded at the battles of Ball's Bluff and Antietam. After the war, Holmes engaged in law practice in Boston, and was editor of the *American Law Review*. In 1882 he became professor of law at Harvard, and in the same year was appointed to the Massachusetts supreme bench. By appointment of President Roosevelt, he succeeded Justice Gray in the United States Supreme Court in 1902. His published works include a volume of *Speeches* and *The Common Law*, the latter a compilation of lectures delivered at Lowell Institute. He also edited the twelfth edition of Kent's *Commentaries*. In 1929 he announced his retirement, at the age of eighty-eight. See SUPREME COURT OF THE UNITED STATES.

**HOLMES, SHERLOCK.** See DOYLE, SIR ARTHUR C.

**HOLMIUM.** See CHEMISTRY (The Elements).

**HOLOCENE, hol' o seen, EPOCH.** See HUMAN EPOCH.

**HOLOFERNES, hol' o fur' neez.** See JUDITH.

**HOOKU,** name of the native dress of Hawaiian women. See HAWAII (The People); HONOLULU.

**HOLSTEIN-FRIESIAN, hole' stin fre' zhan, CATTLE.** See CATTLE, pages 1252, 1253; DAIRYING (The Herd).

**HOLSTON, hole' stun, RIVER.** See TENNESSEE RIVER.

**HOLY ALLIANCE**, a league formed at Paris in September, 1815, after the fall of Napoleon. The originators were Alexander I of Russia, Francis II of Austria, and Frederick William III of Prussia. The professed purpose of the league was to unite the sovereigns in a



Photo: U & U

JUSTICE HOLMES

holy brotherhood of alliance. It issued a declaration that, in accordance with the precepts of Christ, the principles of charity, justice, and peace should be the basis of each sovereign's international relations, and that their great object should be the welfare and happiness of their subjects. The real purpose of the Holy Alliance, however, was to resist republican tendencies and to maintain the power and influence of the reigning families. The agreement was signed by all the European rulers, with the exception of the Pope and the king of Great Britain and Ireland. Metternich, the Austrian minister, was its leading spirit; he gradually obtained almost supreme authority and used the Holy Alliance to favor his own policy. After 1848 it ceased to have any importance.

**Related Subjects.** The aims and the methods of the Holy Alliance will be more fully understood if the following articles in these volumes are consulted:

|                                 |                                  |
|---------------------------------|----------------------------------|
| Alexander (I, Russia)           | Frederick William (III, Prussia) |
| Austria (History)               | Metternich, Prince               |
| Francis (II, Holy Roman Empire) | Prussia (History)                |

**HOLY CITY**, a name given by various sects to certain cities regarded as sacred. Among them are the following: *Allahabad*, that of the Mohammedans of India; *Benares*, that of the Hindus; *Cuzco*, that of the ancient Incas; *Fez*, that of the Western Arabs; *Jerusalem*, that of the Jews and Christians; *Mecca* and *Medina*, sacred to the Mohammedans.

**Related Subjects.** The reader is referred in these volumes to the following articles, for descriptions of the sacred cities:

|           |         |
|-----------|---------|
| India     | Medina  |
| Jerusalem | Morocco |
| Mecca     | Peru    |

**HOLY CROSS, COLLEGE OF THE.** See **WORCESTER, MASS.; MASSACHUSETTS** (Education).

**HOLY CROSS, MOUNT OF THE.** See **COLORADO** (Surface Features); illustration, page 1561.

**HOLY EUCHARIST.** See **EUCHARIST**.

**HOLY FAMILY**, the name applied in art to representations of the Virgin Mary, the Infant Jesus, and their attendants. The earliest of these is found in the catacomb of Saint Calixtus in Rome. In the sixth century the Byzantine schools favored an arrangement in which the Child, in the attitude of blessing, is seated in the Virgin's lap. Later, angels were added as attendants. It was quite late in the Middle Ages when other figures were introduced into the composition. These included Saint Anna, the mother of the Virgin, Saint Joseph, the infant John the Baptist, and Saint Catharine. A German conception shows the Infant playing with the Twelve Apostles as boys. The Madonna and Child proved a favorite subject with the Italian painters of the period of the Renais-

sance. Some of the earliest of these pictures were supposed to have been painted by Saint Luke, and to be endowed with miraculous powers, being capable of healing diseased persons who looked upon them with the eye of faith. See **MADONNA**.

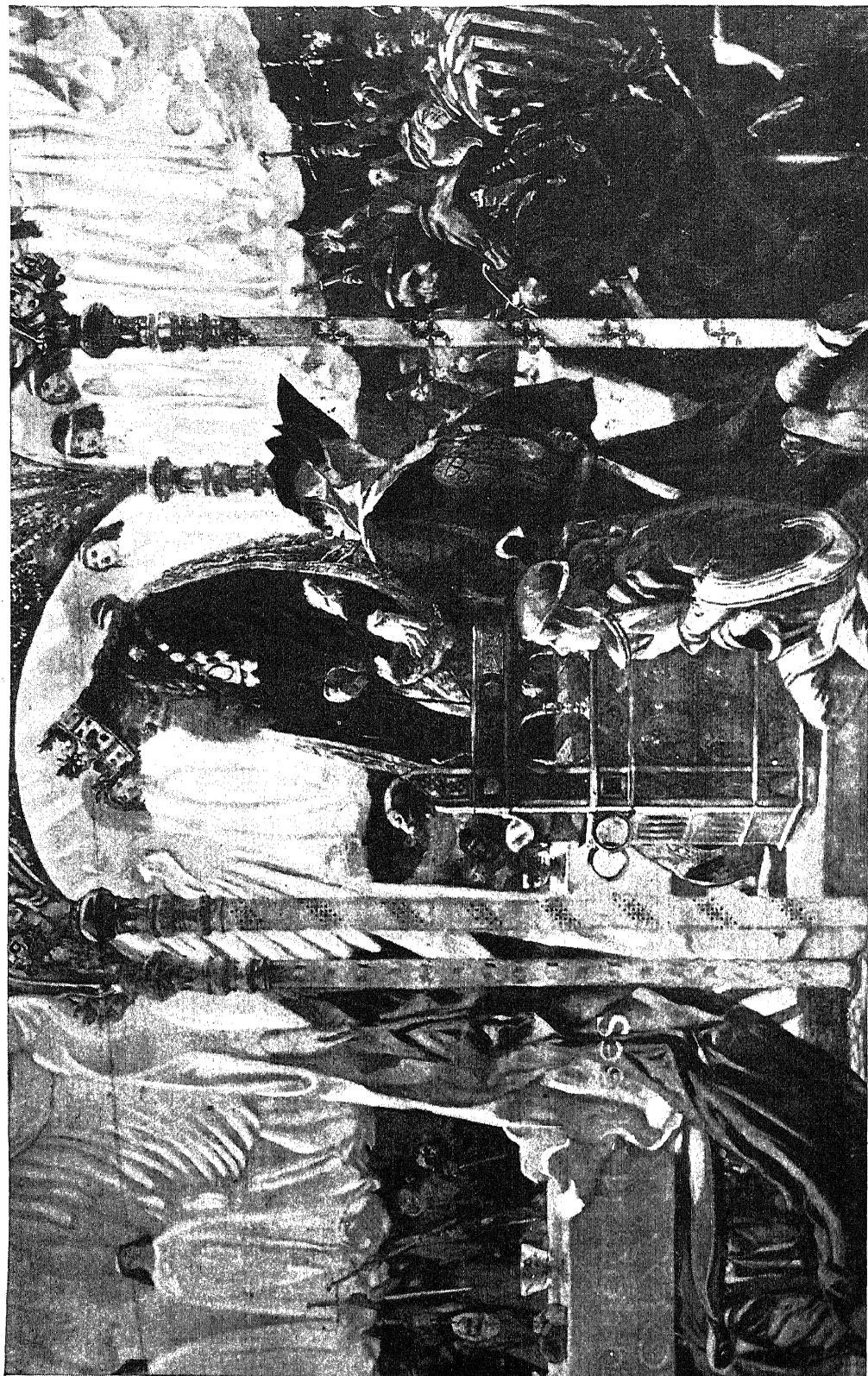
**HOLY GRAIL**, *grale*, in legend, the sacred cup from which Christ drank at the Last Supper with His disciples. Just when the stories that have been woven about the Holy Grail had their beginning no one knows, but they were first put into literary form by three Norman-French writers at the close of the twelfth century. The first important version of the Grail stories in English literature is the work of Sir Thomas Malory, who lived in the fifteenth century. About 400 years later, the legend was given poetic treatment by Alfred Tennyson, whose *Holy Grail* is one of the most beautiful poems in his *Idylls of the King*. Tennyson's version has many spiritual elements that are lacking in the older stories. It is essentially as follows:

As Christ hung upon the cross, Joseph of Arimathea, one of His followers, brought the sacred cup and caught within it the blood which dripped from the wounded side of his Master. In the days of persecution which followed, Joseph was driven out of Palestine and found refuge in Glastonbury, in the island of Britain (England). With him he carried the ho'ly cup, which remained on earth for many years to bless mankind and to heal the diseases of those who looked upon it or touched it. Then, in an age of evil, the Grail was taken away to heaven, and during many long, weary years its healing powers were lost to the world.

In the days of the good King Arthur, who lived at Camelot with his knights of the Round Table, a vision of the Holy Grail was granted to Sir Percivale's sister, a sweet and saintly nun. She told her brother of the wonderful sight, and when he had related the story to his brother knights, each took a vow to seek the vision.

Of the knights, the noblest and purest was Sir Galahad. For him, Sir Percivale's sister cut off her shining hair and braided a strong sword belt, giving it to him with these words: "Go forth and thou shalt see what I have seen, and break through all, till one crown thee king, far in the spiritual city."

Then Sir Galahad rode away on a snow-white steed to seek the vision of the Holy Grail. After many adventures, he appeared one day before Sir Percivale, all clad in shining armor. As the day began to darken, the two knights came to a great marsh which ran out into a mighty sea, and on this rose a bridge of a thousand piers. Then, in wonderment, Sir Percivale saw his companion leap upon the gleaming bridge, and as he passed along it, every span that he crossed sprang into fire.



The Holy Grail. "The Seat Perilous," by Edwin A. Abbey, in the Boston Public Library.

Long afterward, Sir Percivale told a wonderful story of how, three times above Sir Galahad's head, the "heavens opened and blazed with thunder such as seemed shoutings of all the sons of God," while the sacred cup, wholly unveiled, hung in the sky like a burning jewel. Then, far away where sea and sky seemed to blend, there rose a celestial city, into which the knight and the Holy Grail were drawn:

I saw the spiritual city and all her spires  
And gateways in a glory like one pearl—  
No larger, though the goal of all the Saints—  
Strike from the sea; and from the star there shot  
A rose-red sparkle to the city, and there  
Dwelt, and I knew it was the Holy Grail,  
Which never eyes on earth again shall see

In the version of Sir Thomas Malory, the Grail is seen by Galahad, Percivale, and Bors, who follow it to the Far East. After a vision of the holy vased is permitted them, Galahad's soul is carried up to heaven by angels. Percivale dies in a hermitage, and Bors alone returns to Britain. Still another version is that of the German poet, Wolfram von Eschenbach, whose *Parsifal* is one of the finest poems ever written on the legend. On this, Richard Wagner based his great music drama *Parsifal*.

The treatment of the legend in art includes a famous painting of Sir Galahad, (see page 2660), by the artist George F. Watts, and Edwin Austin Abbey's magnificent frieze setting forth the story of the Holy Grail. The latter is one of the glories of the Boston Public Library.

B.M.W.

**Related Subjects.** The reader is referred in these volumes to the following articles:

|                     |                     |
|---------------------|---------------------|
| Abbey, Edwin Austin | Joseph of Arimathea |
| Arthur, King        | Parsifal            |
| Galahad, Sir        | Round Table         |
| Idylls of the King  | Watts, George F.    |

**HOLY LAND**, a name applied to PALESTINE (which see).

**HOLY LEAGUE**, a name applied to several alliances between European princes for defense or for aggressive warfare. The term *holy* was given to almost any alliance which met with the approval of the Church. The most important was that of 1576, which was formed by the Catholic party of France, the Pope, and the king of Spain for the purpose of suppressing the Huguenots (which see). This Holy League led to wars which were not ended until Henry of Navarre defeated the Catholic forces at Ivry in 1590. See HENRY (IV, France).

**HOLY OFFICE.** See INQUISITION.

**HOLY OF HOLIES.** See TABERNACLE.

**HOLYOKE**, *hoh'l' yohk'*, MASS., a city of Hampden County, noted for the size and number of its paper mills, and known locally as "the Paper City." It is situated in the western part of the state, on the west bank of the Connecticut River, eight miles north of

Springfield. Boston is 107 miles east and New York is 143 miles southwest.

Holyoke is located on the side of a hill in the most beautiful part of the Connecticut Valley, and is surrounded by the river on all sides but the west. Some of New England's finest mountain resorts are in the vicinity. Near by are Mount Tom (1,266 feet), topped by Summit House, and Mount Holyoke (955 feet). These points of scenic interest are ascended by electric railways.

The first settlement of Holyoke was made by Irish families, and for a time it was known as Ireland Parish. In 1786 it became a part of West Springfield, in 1850 was incorporated as a separate town, and was chartered as a city in 1873. Population, 1928, 60,400 (Federal estimate).

**Railroads.** The city has the service of the Boston & Maine and the Westfield branch of the New York, New Haven & Hartford railroad; electric lines lead in all directions.

**Industries.** An immense granite dam gives the river a fall of sixty feet, providing water power for the great paper, silk, alpaca, and thread mills for which Holyoke is world-noted. These mills make fine stationery, tablets, and pads, satins and taffetas, blankets, and plush and woolen goods. The city is an important center for hydraulic engineering and for testing water wheels; it has the greatest power-pump works in the world.

**Institutions.** Holyoke has three hospitals, — library built by popular subscription, a College of Music, and Saint Vincent's and Holy Family orphanages. Within twelve miles of the city are ten noted colleges, including Amherst, Smith, and Mount Holyoke.

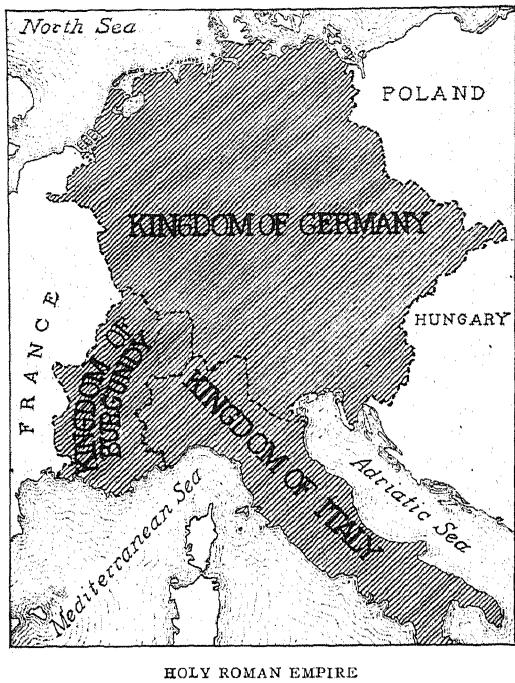
**HOLYOKE, MOUNT**, the western peak of a small mountain ridge, located six miles north of the city of Holyoke, Mass., on the east side of the Connecticut River Valley. Viewed from the summit, 955 feet above sea level, this river affords exquisite scenery. An automobile road winds up the well-timbered mountain-side, and an electric railway also carries passengers up the last 600 feet. At the top stands a hotel built in 1821. A few miles south, in the little town of South Hadley, is located Mount Holyoke College, founded by Mary Lyon in 1837, for the education of women. See MASSACHUSETTS (The Land).

**HOLY ORDERS.** See ROMAN CATHOLIC CHURCH (Doctrines and Sacraments).

**HOLY ORTHODOX CATHOLIC AND APOSTOLIC CHURCH.** See GREEK CHURCH.

**HOLY ROMAN EMPIRE.** Nothing can give a truer idea of this curious medieval political creation than Voltaire's statement that it was "neither holy, nor Roman, nor an empire"; yet it played a very real part in the history of Europe for centuries. It claimed to be a continuation of the Western Roman Empire, and was founded by Charlemagne, though the title *Roman Empire* was not used until 962,

when Otho the Great was crowned by the Pope; Frederick Barbarossa first made use of the term *Holy*. Theoretically, the emperor at the



Its boundaries in the year 1125.

head of this most Christian state was ruler of all the Christian countries of Western Europe, but practically he had control only of Italy and the German states, with their dependencies.

The emperor was elected by the German princes, and when he proved to be a strong ruler, like some of the Hohenstaufens, his title conferred real power, but after the thirteenth century, this power gradually declined until the title became little more than an empty honor. The name Holy Roman Empire became extinct in 1806, because of the conquest by Napoleon of many of the states. Thereupon, Francis II gave up the title of Holy Roman Emperor, adopting, instead, that of emperor of Austria.

**Related Subjects.** The important part played by the Holy Roman Empire in European history will be evident if the following articles are consulted:

|                             |                           |
|-----------------------------|---------------------------|
| Charlemagne                 | Germany (History)         |
| Charles (Holy Roman Empire) | Henry (Holy Roman Empire) |
| Francis (II, France)        | Maximilian I              |
| Frederick I                 | Otho (Holy Roman Empire)  |

**HOLYROOD**, an abbey and a palace in Edinburgh, Scotland, built by James IV about 1501. Here James located the capital of Scotland, and the palace became the chief seat of the Scottish sovereigns. When Queen Mary returned from France, in 1561, she made this

her home, and here Rizzio was murdered in 1566 (see MARY STUART). The abbey was in the Norman and Gothic styles. Though the abbey has been a ruin since 1688, the palace is still used as a court residence on royal visits, and there have been proposals to improve the surroundings and rebuild the abbey in memory of Edward VII. See EDINBURGH.

HOLY SEPULCHER, CHURCH OF THE. See JERUSALEM.

**HOLY SPIRIT PLANT**, also called Dove PLANT, a species of orchid found in Central America, especially in the vicinity of Panama. It derives its name from the resemblance of its united stamens and pistils to a dove hovering with outstretched wings, similar to that typifying the Holy Ghost in religious pictures. The flower stem is four to six feet high and bears creamy-white, fragrant flowers, which are often flecked on the inside with red. The plant is much used for altar decoration in churches in Central America. See ORCHID. B.M.D.

B.M.D.

**Scientific Name.** The plant belongs to the family *Orchidaceae*. Its botanical name is *Peristeria elata*.

HOLY SYNOD, *sin' ud.* See RUSSIA  
(Religion); GREEK CHURCH.

**HOLY THURSDAY.** See ASCENSION DAY;  
**MAUNDY THURSDAY.**

**HOLY TREE**, an old-time name for the holly (which see).

HOLY WARS. See CRUSADES.

**HOLY WATER**, water blessed by a priest, used in the Greek and Roman Catholic and certain Episcopal Churches in religious ceremonies, to sprinkle the people and objects employed in religious practices. According to *Ezekiel xxxvi, 25*, it is the natural symbol of spiritual purification. "Then will I sprinkle clean water upon you, and ye shall be clean: from all your filthiness, and from all your idols, will I cleanse you." G.W.M.

G.W.M.

**HOLY WEEK**, the week immediately preceding Easter, and consecrated to the commemoration of the final events in the life of Christ. Holy Week in Roman Catholic and Anglican churches is marked by added solemnity and abstinence, as preparation for the festival of Easter. On the Sunday before Easter, Palm Sunday, Christ's triumphal entry into Jerusalem is commemorated. The days having the greatest significance in the following week are: Wednesday, frequently called *Spy Wednesday*, which recalls the betrayal of the Master by Judas; *Holy Thursday*, observed in memory of the Last Supper and the institution of the sacrament of the Eucharist (see **MAUNDY THURSDAY**); and Good Friday, which commemorates the death of the Saviour. The observance of Good Friday as a legal holiday is largely increasing among English-speaking people, even among denominations other than the Roman Catholic.

G. W. M.

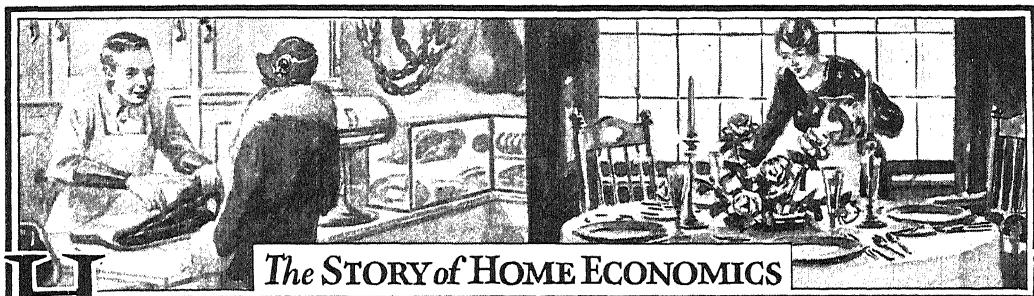
**Related Subjects.** The reader is referred in these volumes to the article FESTIVALS, and list of topics indexed therewith. See, also, PALM SUNDAY; GOOD FRIDAY.

**HOMAGE**, *hom' aje*, in the feudal system of the Middle Ages, was the solemn declaration of allegiance by a tenant or vassal to his lord. During this ceremony the tenant knelt, and placing his hands between those of his lord, proclaimed himself the latter's vassal. The lord then gave him a kiss on the cheek and raised him to his feet (see CHIVALRY). Homage was

abolished by statute in 1660. In modern English law, the term is still used to describe the oath of allegiance taken by the nobles on the coronation of a new ruler; it also applies to the oath of fealty that is taken by a newly appointed bishop or archbishop to the head of the Church.

**HOME CANNING CLUB.** See BOYS' AND GIRLS' CLUBS.

**HOME DECORATION.** See INTERIOR DECORATION.



**H**OME ECONOMICS, *ē kō' nōm' iks*, OR HOME-MAKING. Home-making is the oldest, best-known, and most inclusive profession the world has ever known. Because it is largely a labor of love, beyond the province of commercialized calculation, it has failed to receive the state and national recognition awarded other skilled professions. It has for many years been studied, if at all, under the name *Domestic Science*, but such a term is forbidding rather than inviting. Home-making is not a standardized profession, but therein lies its charm. The home is the only place in all the world in which there is an opportunity for untrammeled growth, without fear of criticism, in all that goes to make men and women great. The home should be the centralizing agency of all that love and hope and joy are capable of bringing together.

The home-maker, more than any other individual, is governed by circumstances, conditions, and environment. One of the greatest resources of the home-maker is the ability to meet all of the foregoing conditions and emergencies graciously and efficiently.

The duties of the home-maker in the various departments of home-making are as diversified and important as those of the general manager of one of the great railroad systems of the country, to whom is entrusted the transportation of men and women.

Such a general manager has gained his position through actual experience in the discharge of various duties in each division under his control. His business is so to correlate and harmonize those departments that they will, as a whole, serve the people safely and well. The successful home-maker gives her family the same efficient service.

The general manager must understand and be able to meet the many unexpected conditions and emergencies that cannot be scheduled; so must the home-maker. If there is a collision or a washout, the manager of the railroad must have his forces so well within his grasp that repairs may be made without undue loss of time or energy; in a like manner must the home-maker meet the everyday emergencies of the home. The railroad manager deals with both the theory and practice of technical construction in material things, in order that human life may be safe. The home-maker, who deals with the growth and development of that human life, should have as great an understanding and as definite a knowledge of the many materials and processes that go to make up the efficiency of the home and the life of its inmates.

The home-maker should be as thorough and efficient in the management of the home as the business man is in the management of commercial affairs, and added to that great field of systematic efficiency must be that love and human sympathy of which the commercial world is oftentimes forgetful. The home-maker, to whom is entrusted the development of human life and growth, must understand the needs of human construction; must understand that the mind is made to plan and command control; and must understand the function of the brain forces, and their capacity and ability to control the physical being.

The home-maker cannot conceal inefficient service in the home, for sooner or later the school and the business world must harvest the home crop. It depends upon the home-makers of the country to determine what the national harvest shall be. Each member of a family

must be some kind of a home-making unit. No one can be free from personal responsibility. Each activity of the home represents a different problem, which the home-makers must unite into a harmonious productive unit, of value to itself and the community.

The home and the business life are on an equal basis of importance in the development of human efficiency. The home, the school, and the business world are important educational factors for the development of national efficiency; one cannot exist without the help of the other. They are also equally responsible in the education of the individual. The higher the standard of the home, the greater will be the efficiency of the nation.

Because it is impossible to consider home-making from the commercial standpoint only, it has been neglected and overlooked. It has been looked upon, until within the last few years, as an occupation quite beneath the dignity of learned student bodies. More attention was formerly devoted to the finding of a husband or wife and trusting blindly to the future, than to the great problem of home-making, which should be the ultimate aim of this great partnership.

**What the Home Demands.** The first great question which meets the home-maker is that of the family income and its division among the diversified needs of the home. The purpose of every home is comfort, but comfort does not mean ornate display and the purchase of certain articles simply to keep up appearances. When we consider the immense sums of money expended by home-makers annually just for the necessities of life, the question of buying becomes an important national as well as home problem.

There is no use in telling the housewife how to divide the weekly salary wisely, who never sees it until after the husband has not only divided it, but retained all but the last ten per cent. The wives of such men are not real home-makers; they cannot be, for they have at this stage an inferior tool with which to do the work. No matter what the family income may be, the average man knows that it must be divided according to the needs of the family, with something laid aside for emergencies or for old age.

**Buying for the Table.** A logical method of buying for the table may be briefly stated, as follows:

**First.** There must be actual knowledge of the amount of money that may be set aside each month for table expenses.

**Second.** Divide the table appropriation into as many parts as there are members in the family, including in this division expense of fuel, service, and ordinary waste, thereby making the table appropriation a mathematical problem as well as a scientific proposition.

**Third.** Study the market and purchase only those foods that contain, when prepared for the table, equally balanced portions of carbohydrates, minerals, proteins, and fats (see Food).

**Fourth.** Do not purchase foods out of season.

**Fifth.** Do all special entertaining, if it is possible so to plan it, when fruits and vegetables are in season.

**Sixth.** Buy in bulk whenever possible.

Whatever is put into the stomach must have both present and future value. Growth, energy, and efficiency depend upon the kind of food that is eaten, and upon one's ability to digest it. The first introduction to good digestion is attractiveness. Unattractive food sows the seed of indigestion through its repulsiveness, before it has entered the stomach. The digestive apparatus is not efficient when the mind is in a repellent state. Buying and cooking are really the beginning of digestion; the activity of the cells in converting the food into liquid before it reaches the blood must do the rest.

The buyer should learn to think and speak in terms of carbohydrates, proteins, fats, and calories. The constant application of these terms to the daily purchases will greatly facilitate one's ability to supply the table with those foods that supply bone, muscle, tissue, warmth, and energy to the family. Habit usually guides an individual in the choice of foods. Home-makers may through their wise selection greatly assist in the formation of food habits.

When buying in small quantities, watch well the weights and measures. Short weights waste many a dollar for the home-maker. Consult with the grocer, but do not depend entirely upon his judgment. He is there to supply your demands and cannot be the best judge of what foods will supply the greatest needs of the family. Personal attention to every article purchased is the only solution of the buying problem.

Every buyer should have the proper equipment for the preparation of the foods. In many cases, it will be advantageous to have a cool storeroom, a space that may be filled with emergency foods. Such a room should contain a good supply of canned goods (preferably home-prepared), fruits, vegetables, smoked and dried meats, salt fish, dried fruits, rice, beans, oatmeal, corn meal, flours of various kinds, cheese, condensed milk, olives, prepared oils for cooking, and such vegetables as will keep.

**Bread.** As about two-fifths of the ordinary weight of food consumed by the average family is bread, it becomes the most essential food product of everyday life. As more bread is made from wheat than from any other grain, wheat is the raw material which should be best understood by the buyer.

In point of economy, there is very little difference between home-made and bakers' bread; but there might be a great difference in the food

value if home-makers understood how to secure the best results in food value from every bushel of wheat used in bread-making.

The most important food essentials are found in the outer layer of the perfect wheat kernel. The bran and the germ contain essential food values. The old process of milling did not eliminate these substances, but the keeping qualities of the flour were impaired. The highly milled white flours differ greatly in different sections of the country, owing to the different kinds of wheat grown. Mills of the Northwest use the spring wheat, those of the Southwest the hard winter wheat; in some sections, only soft winter wheat is milled. Some millers use a combination of wheats to secure different grades of flour.

Since there is no absolute standardized test for the quality of flour by the consumer except through its use, it is best for the home-makers to adopt the brands that give them the best results when used according to individual methods. As the highly milled flours which are commonly used in bread-making lack some of the most nutritious elements of the natural grain, the home-maker has learned to introduce coarse flours, such as bran, oatmeal, and corn meal, in order to produce a properly balanced food for the family. This method increases the cost of the bread without bringing adequate returns. The different flours and meals thus used are milled separately, and the buyer must pay for two processes instead of one. He pays for the process of division, although nature originally combined the different flours in one grain.

It is not the price of foods that should claim our attention, but the manner in which the food is produced. Every buyer should know the food value of every natural product, in order to purchase table supplies intelligently.

All whole-wheat flours and cereals should be 100 per cent wheat, if the best results are to be obtained when they are used as human food. Whole wheat, whole oatmeal, unpolished rice, and unpearled barley each contain essential nutritive substances that are removed through the modern process of preparation for the market. The adoption of whole-grain foods would mean an increase of at least twenty-five per cent in the health of many people. In this connection, it is worth noting that nothing is expensive that gives full return for the money and time expended. The cheapest foods, from a money standpoint, may be the most expensive in the end. All denatured, bleached, degerminated, polished, and otherwise doctored foods are relatively weak in food value. Every purchaser of foods should understand that pure whole-wheat flour contains all the food elements demanded by the normal adult, although it may be too heavy for invalids and children.

Whole wheat contains a larger proportion of

brain and nerve food than any other article of diet. The purchase of whole-wheat and corn products, together with an intelligent understanding of their use in the daily menu, is one of the most important items in the budget of the modern home-maker. Housekeepers should gradually replace the highly milled white flour with attractive dishes of whole oats, whole wheat, and corn meal, which may be made into many different kinds of bread, boiled and baked puddings, cakes, and biscuits.

*Meats.* Next to grain foods, the most important material for the furnishing of the table is the meat. Good buyers must study their composition. Meat furnishes the material necessary for the growth and repair of the body, but it should be used with discretion, as its excessive use is one cause of ill health. Temperance in eating is just as important as in drinking.

The price of meat depends upon the cut more than upon the nutritious quality. Plenty of vegetables should be used with all meat rations. The quick-cooking cuts of meat are the most expensive, but the food value is no greater than that of the cheaper cuts; the latter require longer cooking because they are taken from the active parts of the animal and are somewhat tougher in fiber. If it were not for the word "stewing" and the occasional unsightly appearance, as well as the insipid flavor, of most stewed meats, the cheaper cuts would be more popular; many of them are really more nutritious. Scientific cooking has taught the home-maker how to make the neck and shoulder pieces into attractive dishes at a minimum of expense. Meat that was at one time used only for stews is now roasted in an air-tight receptacle, browned, and garnished until it resembles a tenderloin in appearance.

When selecting meat, note that it is dry on the surface and feels soft and firm to the touch, but not hard. The round steak from a fat animal is better than the finest cut of porterhouse from a lean or old animal. Meat from a fat animal has higher food value than that from lean animals. An experienced buyer soon learns to know the quality of meat from its color and general appearance. Beef is a rich, dark red when first cut; it might be described as a bluish-red, but it grows lighter and brighter after its exposure to the air for a short time. The fat is white. Old beef is of a dark brownish-red, with yellow fat. Veal is a dull bluish-pink. The younger the veal, the more the blue predominates in the pink. Mutton is a dull, heavy pink or grayish-red, with white fat. Lamb is lighter in color than mutton; it is more pink in color and has slightly pink bones. Pork at its best has a streak of fat and a streak of lean of good color and firm texture.

In buying poultry, it is well to select the specimens when they are alive, as it is easy to determine healthy stock by noting appear-

ance. There should be fatness and plumpness. A young, healthy fowl has bright eyes, smooth legs, plenty of pin feathers, and the end of the breastbone is soft.

Geese, ducks, and pigeons are good for eating only when they are young. Great care must be exercised in the selection of fish. See that it is firm, with scales firmly set; the eyes should not be absolutely lifeless; the tail should not droop. Every part of the fish should hold together and be firm to the touch. Never purchase fish that has a strong odor.

*Vegetables.* Between bread and meat there is the great variety of vegetables which contain all of the different properties required to prepare a perfectly balanced menu. Preparation of foods becomes an interesting study as soon as their composition and uses are thoroughly mastered. Perfect buying is only attained when the buyer understands just what kinds of food are required to develop the human body so that it may perform normally all of its functions. Vegetables supply most of the potash, iron, and other minerals required by the average individual. As most vegetables keep well, it is best to purchase them in comparatively large quantities when they are in season and are not expensive. They may be preserved by being buried in sand in a dry cellar, and by canning.

Vegetables are best steamed or boiled in a small proportion of water, as most of the mineral salts lie near the skin. When buying rooted vegetables, select those that are smooth and tender. The tops should be fresh. All green vegetables for uncooked salads should be fresh and crisp. Never purchase canned vegetables when fresh ones may be obtained, as the process of canning removes some of the most important food qualities. In selecting canned goods, be sure that the can does not bulge. The materials in bulging cans are almost always unsafe as food, for fermentation is indicated. Never buy old canned goods; as foods they lose in quality after having been canned a year.

*Tea and Coffee.* Purchase coffee only in small quantities, unless it is browned in the home. Browning is becoming a neglected art. Green coffee may be purchased safely in large quantities, as the berry improves with age until after it is browned; then it quickly loses its flavor unless it is immediately placed in air-tight cans. Cheap teas are the most expensive in the end, since they are not as strong as those slightly more expensive, and more tea is required for each person. Black tea goes through a process of fermentation in the curing and is less apt to cause indigestion and nerve trouble than green tea. Green tea contains a larger amount of tannic acid than black, and is more harmful. In buying tea, select that which is free from stems and dust.

Both tea and coffee are stimulants, and have no food value in themselves.

**Have a Bank Account.** It is the function of the home-maker to plan, provide, and execute according to the family income; consequently every home-maker should have a bank account, no matter how small. A bank account teaches thrift and self-respect. The simpler banking methods are important business methods that every home-maker should understand and practice.

Every check that passes through the bank is a receipt. Bills paid through the bank cannot be disputed. One soon learns of many ways and means that will add to the bank account.

**Extravagance.** One of the most ill-advised methods of buying is to believe that one must have the very earliest products, or must purchase an article because it is popular. Never purchase a thing because it is the latest "craze." Purchase only those things that are adapted to the needs and comforts of the family, and buy them in season.

Economy demands constructive thinking and constructive planning, if waste incurred by useless buying is to be avoided. Have a definite idea and purpose; buy for the health, comfort, and progress of the family, and not for the purpose of keeping up appearances.

It is extravagant to purchase articles of wear or for the home that are not in any way related to those already in use. Such things add to the expense without bringing adequate returns in comfort and happiness. E.J.

**The School and the Home.** Home economics work in schools is closely allied to actual home conditions. Indeed, the home has been made the laboratory for home economics for most schools, for school work is correlated with home activities. In many of the larger high schools may be found a kitchen, a dining room and a bedroom. Girls are taught the art of bed-making and the care of the sleeping room; they are taught the furnishing of a dining room; how to set the table for different occasions; how to serve; and in the kitchen they meet with the actual problems of meal-planning and food preparation. Many girls have raised the standards of their families through the instruction received in home economics at school, and many have contracted marriages above the stations of their families because of such training. Mothers are anxious to learn from their high-school daughters all that is being taught the latter in the field of home economics.

This work began in the elementary schools, under the name of domestic science. Cooking was the first subject introduced. This, in part, was due to the business man's demand that vocational subjects be offered in the schools. The response was made by introducing manual training for boys, but the women soon demanded that the girls be taught something of

the household arts. Then followed a few simple lessons in sewing. Both were so successful that requests for broader work along these lines began to come from the high schools.

The Smith-Hughes Act, passed by Congress in 1917, provides for financial aid to each state agreeing to furnish a similar sum for vocational training in the high schools; schools now giving work are known as Smith-Hughes high schools. In order to receive this Federal aid the government requires that if a certain number of pupils elect to take a certain course, it must be offered either as a one-, two-, three-, or four-year course, according to the demands. Home economics and agriculture at once became major subjects in these schools. The growth of interest in home-making soon taxed the ability of the schools to furnish teachers qualified to present these subjects. The result was the inauguration of teacher-training classes in home economics in normal schools and universities.

The result of the home economics work done in these schools has brought about a rather clear-cut classification of home problems. The job of housekeeping has been analyzed. The courses of study present outlines which cover factors obtaining in nearly every home. A home-maker vitally interested in the problems of her home will do well to study some such outline for application to her own activities. The housewife should have the opportunity of taking as intensive a course in home-making as that accorded to her daughter by the average high school. If that is not possible, every woman can make her own outline, and proceed to make a study of the problems that confront her in her own home. Such a study might be made possible through the classification of problems as presented in many of the schools. These problems have been divided into groups, as follows: (a) The economic, or business, problems of the family; (b) shelter; (c) food; (d) clothing; (f) higher life; (g) family relations. Each of these groups covers a number of subjects, some of which overlap those in other groups.

A few of the problems to be studied under each of these groups are listed below, and many of them will be found in the body of this work in proper alphabetical order.

**The Economics of the Family.** This covers the problems connected with the earning, the spending, and the saving of the family income. The relation of husband and wife to the family income has caused much trouble in family life. A definite understanding of mutual rights in income should be reached. Should the income be considered as a joint account, or should the wife be given an allowance? Should she have something to say about the disposition of earnings? Is her work as a manager and a financier of monetary value? Is she as much of a wage-earner as is the husband who works on a wage or salary?

An elementary knowledge of banking and of the relation of the bank to the home should be acquired. Is credit of value to the home-maker? Should she maintain charge accounts, or pay cash? How can the family save? How can it safely invest its savings? What is a budget, and how can one be made? What kind of accounts should a housekeeper maintain? All these are economic problems of vital import to the home.

**Shelter.** This involves all of the problems connected with renting or home ownership. Is it cheaper to own or to rent? How much of the income should be allowed for rent? Should one pay himself rent if he owns his own home? If so, why? What are the differences between renting a house and an apartment? What are the rights of a tenant under a lease? What does it cost to maintain a house? What should one know about fire insurance? How can labor be saved in the home? Can the kitchen be rearranged to save steps? What labor-saving devices will save work in the home? What about the legal aspects of home-ownership? What is joint-tenancy? There are problems connected with deeds, conveyances, mortgages, judgments, liens, taxes, and special assessments. These are some of the problems being taught in school, and they should become the study of every housewife. One of the problems that now fall under the head of shelter may be the application of art in the home. To make a real home out of four walls requires a knowledge and an appreciation of the elementary principles of art. Since home economics has been taught in the schools, it is surprising to see so many average homes artistically planned and decorated. Evidence of a knowledge of period furniture is also apparent. A study of rugs and carpeting, of pictures, and other decorations for the home is important.

**Clothing.** Is too much or too little being spent for clothing? There was a time when women in the home did their own sewing and most of their dressmaking. They knew how to cut out patterns and even to make their own patterns. Now the commercial pattern has done away with that necessity, and many operations connected with clothing are being done outside of the home. Despite these facts, however, every woman needs to know how to sew and how to make the simpler garments. Nearly all high-school girls are being taught these arts. How may great seasonal outlays for clothing be overcome? Is it cheaper to make or to buy? These are some of the problems studied under this heading.

**Food.** How much should be spent for food for the family? How can one tell unless she knows something of body needs; something of nutrition? Why does the outdoor worker need more and different food than the sedentary worker? What kind and how much food should be served per day for each person? What makes a meal well-balanced? Is enough known about the chemistry of the body, of food, or of cooking? These are subjects now being taught in high schools.

**Higher Life.** This is a term used by home economists to include all expenditures that cannot be classified under the foregoing headings. It includes insurance; doctors', dentists', and nurses' expenses; recreation; church and charity; and miscellaneous expenditures. The term may not have been well chosen, but it has been used for a considerable time. It is in these items that leaks in the family income may often be found.

**Family Relations.** This is a new subject which is being introduced in colleges and larger high schools. It covers the problems of individual life within the family. What should be the relation of the children to the family and to the work of the house? What should be the relation of brother and sister, of husband and wife? Under this heading might be included the courses now given in high schools on the care of the baby and its feeding; on the care of the sick—cooking for them and attending to their other needs.

Then we have the high cost of living and the cost of high living. Standards of living in many cases have been raised out of proportion to the family income. How is such a problem to be solved? It is only an intensive study similar to that being given in schools that will help the individual home-maker to make a success of her calling. The foregoing digest represents what we now know as home economics.

**Related Subjects.** These volumes contain many articles which will be helpful in a study of home economics, and the following are especially recommended. Many of them have extensive lists of related subjects, so that the range of reading is a wide one.

|                            |                             |
|----------------------------|-----------------------------|
| Adulteration of Foodstuffs | Furnace                     |
| and Clothing               | Furniture                   |
| Arts and Crafts            | Heating and Ventilation     |
| Baby                       | Household Arts in Education |
| Canning Clubs              | Human Growth                |
| Child Study                | Industrial Art              |
| Cookery                    | Interior Decoration         |
| Domestic Art               | Life Extension              |
| Education                  | Nutrition                   |
| Electricity                | Physical Culture            |
| Embroidery                 | Sanitary Science            |
| Fireless Cooker            | Sewing                      |
| Food                       | Thrift                      |
| Food Products, Preserva-   | Vitamins                    |
| tion of                    | Vocational Education        |

**HOME ECONOMICS, BUREAU OF.** See AGRICULTURE, UNITED STATES DEPARTMENT OF.

**HOME-MAKING.** See HOME ECONOMICS.  
**HOMEOPATHY,** *homē op' a thīē*, a system of internal medicine, the fundamental principle of which is based on the law, *Similia similibus curantur* (Like cured by like). Though referred to by several physicians before the eighteenth century, it was first given practical application by Dr. Samuel Hahnemann of Leipzig, about the beginning of the nineteenth century. He applied the name *homeopathic* to this system to distinguish it from the old school, which he called *allopathic*.

Hahnemann's theory was that a drug which will produce certain disease symptoms in a healthy person will cure a sick person presenting the same group of symptoms. To determine the curative properties of various drugs, he "proved" them in the following way: A dose of the medicinal preparation chosen for the test was given to a healthy person at certain intervals, until deviations from normal health were produced, and during the process, his symptoms were carefully noted. These symptoms were recorded and compared with those noted in various diseases, and the drug

producing them was selected as the remedy for the disease having the given or similar symptoms. More than ninety drugs were proved by Hahnemann in experiments upon himself and others.

Hahnemann believed that for curative purposes the poisonous principles in powerful drugs, such as belladonna and aconite, should be reduced until the remedy was incapable of producing drug effects.

At one time homeopathy had considerable influence in both the United States and Canada, but as a distinct school of medicine it is declining. Physicians who still call themselves homeopaths variously modify Hahnemann's principles in accordance with more modern practices, recognizing that the law of like cured by like does not have the wide application that was originally claimed for it. See HAHNEMANN, SAMUEL CHRISTIAN. W.A.E.

**Derivation of the Name.** Homeopathy is a compound of two Greek derivatives: *homoē*, meaning *similar*, and *pathē*, meaning *feeling* or *disease*.

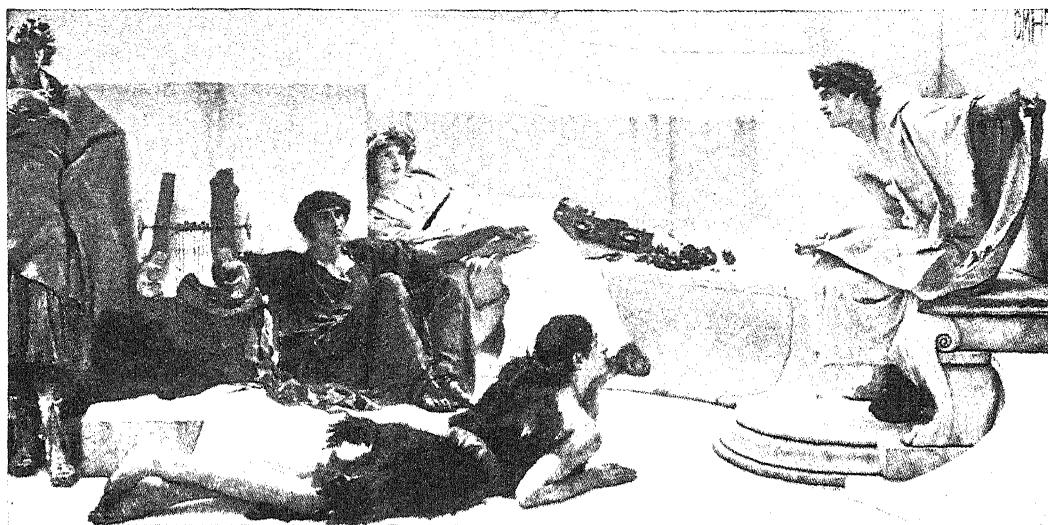
**HOMER**, one of the greatest names in all literary history, and the oldest in the literary history of Europe. Scholars have written long and learned books to prove that such a person never existed—that the poems ascribed to him were the product of generations of minstrels; but despite these, his name will stand to all time as that of the author of two of the world's supreme epics, the *Iliad* and the *Odyssey*.

**The Greek Idea of Homer.** The ancient Greeks, who regarded his works as classics and made them the center of a literary education, did not question his real existence. To them he stood as a gigantic figure, blind but powerful, shrouded in the mists of the past, and they produced many biographies of him. With nothing but legend to draw upon, these differed even in their statements of his birthplace, and later writers made an epigram on the subject of their disputes:

Seven wealthy towns contend for Homer dead  
Through which the living Homer begged his bread.

All of these old "lives" agree on a few points—that Homer was blind, that he was very poor, and that he wandered about from town to town, chanting to the music of his lyre those rhythmic sagas at which the world has not yet ceased to wonder. As to the time he lived, there was wide difference of opinion, some placing him as far back as the early twelfth century B.C.; some—though these are fewer—as late as the seventh.

It is known that the poems were recited in Sparta as early as 600 B.C., and from that time on, their reputation grew. Powerful rulers took time from their war-making to see that his works were properly edited and arranged; each city had its own valuable copy; and Alexander the Great, it is said slept with these "divine



From the painting by Alma Tadema

"A READING FROM HOMER"

poems" at his head. Later, when knowledge of the classics was lost to Western Europe, it was kept alive in the Byzantine Empire, and a renewed interest in the writings of Homer made up a large part of that wonderful awakening known as the Renaissance.

**Modern Views.** When modern critics began to study this most famous poet of the past, they differed not at all from the ancient Greeks in the honor which they were willing to pay to his name, but they found themselves confronted with many questions. First, they denied his authorship of all the minor poems accredited to him, and then began actually to doubt his identity. They saw in his name merely the word "compiler," through the centuries invested with the force of a proper name, and they thought they found indication that more than one man and more than one age had contributed to the wonderful poems. It is a question which, in the nature of things, can never be settled, but fortunately it is not vital.

What is vital is the charm of the poems—the rapid movement, the simple, noble style, the stately music of the long lines, the characters who even to-day stand out as living persons. Vital, too, is the great debt modern scholarship owes to the *Iliad* and the *Odyssey* for knowledge of the very ancient Greeks. Save for them, little would be known about the Greek ideas of the gods and their attitude toward human affairs, or about the great heroes and their marvelous doings; nor would information as to Greek modes of life be nearly as full as it is.

To later poets, Homer's works have been a never-failing source of inspiration. More than one distinguished writer has translated them in

whole or in part, Pope's rendering being perhaps the best known. Smooth and pleasant as the latter is, however, it misses the majestic spirit of the original, and one of Pope's appreciative but frank friends said to him on its publication, "It's a pretty poem, Mr. Pope, but you must not call it Homer."

**Related Subjects.** The following articles in these volumes may be consulted in connection with this article on Homer:

|                  |              |                |
|------------------|--------------|----------------|
| Epic             | <i>Iliad</i> | <i>Odyssey</i> |
| Greek Literature | Mythology    | Renaissance    |

**HOMER,** LOUISE, an American contralto who has won fame in grand opera and as a concert singer. She was born in Pittsburgh, Pa., and before her

marriage was LOUISE DILWORTHY BEATTY, the daughter of a Presbyterian clergyman. Her talent was early recognized, and, acting on the advice of her teachers, she studied abroad for the operatic stage. Madam Homer made her first professional appearance in Paris in 1898 as Leonora in *La Favorita*, following which she became a favorite with grand-opera audiences in Paris, London, Brussels, and the leading American cities. She performed with distinction the contralto rôles in *Aida*, *La Gioconda*, *Il Trovatore*, *Lohengrin*, *Tristan and Isolde*, and other standard operas, and sang for many seasons



Photo: U &amp; U

LOUISE HOMER

with the Metropolitan Opera Company. Madam Homer has a voice of great richness and a magnetic personality. The composer, Sidney Homer, is her husband. The eldest of their four daughters, Louise Homer Stires, is herself a soprano of considerable reputation, and mother and daughter have frequently appeared together in concert. They have also sung duets for phonograph records.

**HOMER, WINSLOW** (1836-1910), one of the foremost painters in America at the opening of the twentieth century. Distinctly national, his painting shows no European influence in subject or technique.

He was born in Boston, and lived there until his twenty-third year. The experience he had gained on the staff of *Harper's Weekly* helped him to secure work in illustrating while he studied at the National Academy of Design in New York City. After the War of Secession, Homer went to Europe and exhibited several of his oil paintings with success. He returned from a ten months' visit in Paris without showing the slightest French influence in his work. He was a member of the American Academy of Arts and Letters, and of the New York Society of Painters in Water Colors.

Homer's work is divided into two periods. During the first period, he chose subjects of everyday life in New England and Virginia. While serving as a war correspondent with the Northern troops in the War of Secession, he painted some of his most famous pictures. *The Prisoners from the Front* is perhaps the most popular, but *Rations* and *The Bright Side* are also celebrated. After 1880 he painted marine scenes only. For a year, he lived on the eastern coast of England, but after 1884 made his home on the coast of Maine near Scarborough, and worked on that series of paintings of the ocean and fisherfolks which placed him in the first rank of American painters. His masterpieces are *On a Lee Shore* and *The Maine Coast*. He traveled extensively, and commemorated each trip with brilliant water-color drawings.

**Other Works.** These include *Mending the Nets*, *Lost on the Grand Banks*, *Inside the Bar*, *The Life Line*, *Eight Bells*, *Northeaster*, *Lookout—All's Well*, *Cannon Rocks*, *Undertow*, *Wrecking of a Vessel*, *Eating Watermelon*, and *The Cotton Pickers*.

**HOME RULE**, in British politics, a phrase associated with Ireland's attempts, long defeated but finally successful, to secure self-government. From the date of the Act of Union of 1801, which united Ireland and Great Britain under a single Parliamentary government, to the final settlement of the controversy in 1921, there had been dissatisfaction in Ireland with the existing government, at times reaching the point of open rebellion. Ireland, in fact, during the hundred twenty years, was ruled from London, and the Lieutenant

Governor and his subordinates stationed in Ireland did little except to obey orders from home. Almost from the first, there were Irishmen who wanted Home Rule, the leading feature hoped for being a native Parliament, to pass all local and internal legislation, the general political government of the empire to be left to the Imperial Parliament, as before.

Ireland, in short, until about 1916, had never asked for a greater degree of self-government than had been given to the Dominion of Canada. The arguments in favor of Home Rule were those by which any nation seeks to maintain its political independence. Against Home Rule was the fact that Scotland and Wales had no separate Parliaments. There existed in North Ireland, moreover, a strong Protestant minority bitterly opposed to Home Rule, because it preferred to be ruled from London rather than by the Catholic majority at home. This opposition centered in Ulster, and particularly in the vicinity of Belfast, where civil war had all but broken out when Home Rule finally seemed inevitable.

**History of the Struggle.** Home Rule first became a dominant issue in 1870, in which year the Home Government Association was organized at Dublin for the purpose of "taking Irish affairs out of English hands." This association represented all shades of religious and political beliefs, with the Protestants and Conservatives in control. In 1874 about sixty "Home Rulers" were elected to Parliament, in which they voted as a unit on Irish questions, but followed their personal inclinations on all other matters. By 1881 there was a split among the Irish members in Parliament; one faction was conservative, the other, led by Charles Stewart Parnell, adopted extreme views. The Parnellites linked the Home Rule issue with the economic issue of land reform, and in this way antagonized the conservative land-owning classes. Thus it happened that Home Rule, supported by millions of Roman Catholic peasants, lost the support of the Protestant middle class which had first controlled the movement.

Parnell's tactics, however, were successful in that the elections of 1885 gave him the balance of power between the Liberals and the Conservatives. In the next year, Gladstone and other leading members of the Liberal party announced their conversion to Home Rule principles. Even Gladstone, however, was not powerful enough to secure the passage of a Home Rule bill in 1886, and in 1893, when he tried a second time, he was again defeated. Under the Conservative ministries of Lord Salisbury and Arthur J. Balfour, considerable progress was made in granting some degree of local self-government, with the result that the Home Rule agitation almost disappeared, and it was not until after the Boer War that the movement gained new strength.

Under the leadership of John Dillon and John Redmond, however, the Irish Nationalists remained a powerful minority in Parliament. The general elections of 1910 again gave them the balance of power, and their support was frankly given to the Liberal Ministry because the latter agreed to introduce a



THE DIVISION OF IRELAND

The Government of Ireland Act of 1920, which established the Government of Northern Ireland, provided that Northern Ireland should consist of the Parliamentary Counties of Antrim, Armagh, Down, Fermanagh, Londonderry and Tyrone, and the Parliamentary Boroughs of Belfast and Londonderry. Under the treaty which set up the Free State, it was provided that a commission should determine, in accordance with the wishes of the inhabitants, so far as might be compatible with economic and geographic conditions, the boundaries between Northern Ireland and the Free State. Both sides claimed Fermanagh and Tyrone. In 1925 the two were given to Northern Ireland.

bill for Home Rule. Accordingly, in 1912 and 1913, Premier Asquith introduced such a bill; both times it passed the House of Commons, but was defeated in the House of Lords. By the Parliament Act of 1911, however, any bill which has been passed in three successive sessions of the House of Commons becomes a law without the assent of the House of Lords. The Home Rule bill was introduced for the third time on March 5, 1914, and was passed on May 25.

The progress of the bill through Parliament was marked by great bitterness in that body, by demonstrations of approval in Dublin, and

by equally enthusiastic demonstrations of opposition in Ulster. The Ulstermen, led by Sir Edward Carson, formed a volunteer militia, and prepared for armed rebellion against any attempts to enforce the law. So bitter and determined were the Ulstermen that some compromise became necessary, and in June, 1914, the Ministry introduced an amending bill, which provided that each county in Ulster might vote on the question whether or not it should be excluded for a period of six years from the operation of the law. Before this amendment could be passed, Great Britain was drawn into the World War, and Parliament passed a bill postponing the inauguration of Home Rule until the end of the war.

In May, 1916, England's most active enemies among the Irish in Dublin fomented a revolution, said to have been encouraged by Germany, and attempted the establishment of a republic under Eamonn de Valera. In four days over 200 people were killed, but the leaders of the insurrection, including Sir Roger Casement, were caught and shot as traitors. Again, in March, 1917, hostility to the government developed; the Irish Nationalists attacked the policy of Premier Lloyd George, hoping to force a general election which might further their cause. On December 6, 1921, after civil war, during which Irishmen proclaimed a republic, a conference between Irish and English leaders gave to the island the Irish Free State.

**Related Subjects.** The story of the organization of the new government appears in the article IRELAND (History: Later Phases of the Home Rule Question). The reader is also referred in these volumes to the following articles:

|                       |                     |
|-----------------------|---------------------|
| Asquith, Herbert      | Lloyd George, David |
| Carson, Edward        | Parnell, Charles    |
| Dillon, John          | Redmond, John       |
| Gladstone, William E. | Valera, Eamonn de   |

**HOME RULE, MUNICIPAL.** See MUNICIPAL GOVERNMENT.

**HOMESPUN**, rough, loosely woven cloth, with plain or twill weave, resembling tweed. Originally, it was made on hand looms, but now is duplicated by machinery. It comes in 48- and 54-inch widths.

**HOMESTAKE MINE.** See BLACK HILLS.

**HOMESTEAD, Pa.** See PENNSYLVANIA (back of map).

**HOMESTEAD LAWS**, in the United States and Canada, include measures of the national government to give farms, or homesteads, to settlers; and statutes of state and provincial governments protecting the settlers after their entry upon the homesteads.

To obtain a free farm from the United States government, it is necessary to live upon a quarter-section (160 acres) of the public lands for five years, cultivating a certain amount of ground each year. In some regions where irrigation is necessary to cultivation, a half-

section may be occupied. Under certain conditions, any man over twenty-one years of age who is or intends to become a citizen of the United States, or any person, man or woman, who is the head of a family, may become a homesteader and receive a *patent*, or title, to the public land he selects, provided he does not own more than 160 acres in the United States or a territory thereof. The only expense is a small fee. A soldier who has seen war service may count his time of service as part of the required time of residence on a homestead. To others, if they pay \$1.25 per acre, the time of required occupancy is reduced to fourteen months.

In Canada a homesteader must reside upon his quarter-section during six months of each of three years, build a dwelling and break at least thirty acres, of which at least twenty must be cultivated. If there is not this amount of arable land in the quarter-section, the ownership of livestock may be substituted for cultivation. In certain districts an additional quarter-section may be obtained by *preemption*; three dollars an acre must be paid for this latter land, and fifty acres of it, or a further fifty acres of the homestead, must be cultivated. In some districts homesteads may be purchased. Any man who has reached the age of eighteen years and is a British subject, or intends to become one, or any person the sole head of a family, may acquire a homestead or *preemption*. Veterans of the wars in which Canada has participated are granted special homestead privileges, but they, too, are required to settle upon and cultivate the land taken up.

**Related Subjects.** For additional information and a diagram of the division of land into quarter-sections, see LANDS, PUBLIC; see, also, PREEMPTION.

**HOME, SWEET HOME.** See PAYNE, JOHN HOWARD.

**HOMICIDE**, *hom' i side*, a legal term which refers to the killing of one person by another. It includes accidental and justifiable killing, as well as murder committed willfully. Excusable, or justifiable, homicide is that which takes place under circumstances of accident or neces-

sity; in either case it cannot be said that the act was intentional, but was committed in self-defense or in the protection of one's family or property. Excusable homicide is not punishable at law, if committed without any fault or intention on the part of the slayer; however, one who kills even in such circumstances is accountable to the law until exonerated by a coroner's jury. Homicide is justifiable when committed under such circumstances of duty as prevention of murder or other atrocious crime, or to prevent the escape of a criminal. All other homicides are punishable as manslaughter or murder. See MURDER; MANSLAUGHTER.

**Derivation.** The word is derived from the Latin *homo*, meaning *man*, and *cedere*, meaning *to kill*.

**HOMING PIGEON.** See articles CARRIER PIGEON; PIGEON.

**HOMOCHITTO RIVER.** See MISSISSIPPI (Physical Features).

**HOMOPTERA**, *ho mōp' tur ah*. See HEMIPTERA.

**HONDO, OR HONSHU, ISLAND OF.** See JAPAN (Location and Size).

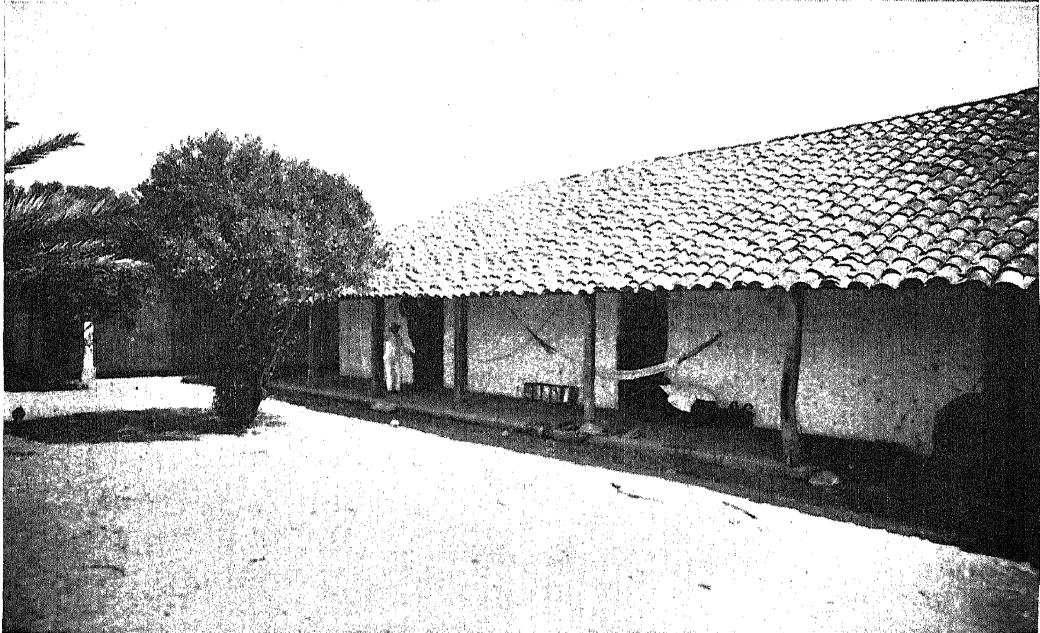
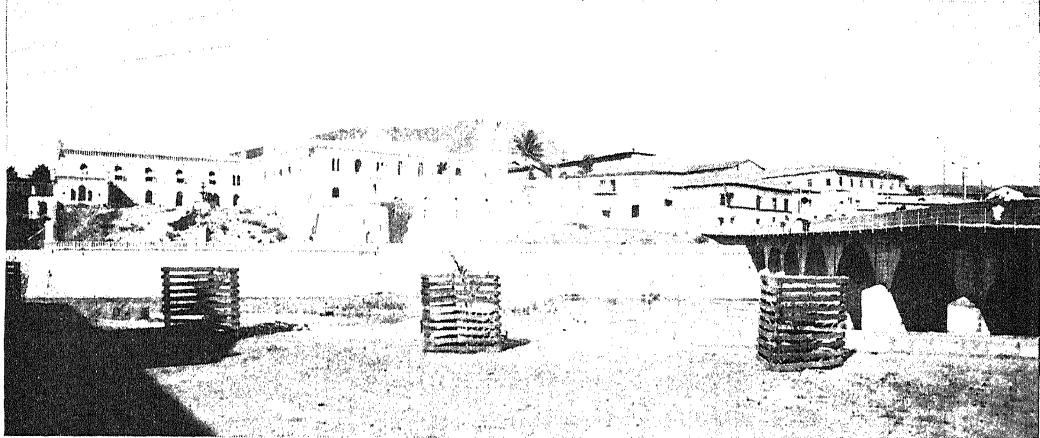
**HONDURAS**, *hon doo' ras*, the third largest of the Central American republics, but the least progressive of all (see CENTRAL AMERICA). Like its southern neighbor, Nicaragua, it is a land of wonderful resources, lying to a large extent idle for lack of enterprise, transportation facilities, and money. The name Honduras is the Spanish for *depths*, and was given to the country because early Spanish explorers had difficulty in finding anchorage off its shores. The country has a low, swampy seaboard of 400 miles, overlooking the Caribbean on the north. On the south it opens to the Pacific through the Gulf of Fonseca, an excellent natural harbor. Salvador occupies the remainder of the southern seaboard; Guatemala lies to the northwest, Nicaragua to the southeast. With an area of 44,275 miles, Honduras is somewhat smaller than the state of Pennsylvania. Its population of about 774,000 averages about fifteen persons to the square mile.

**The People.** The people are mainly Indians, and negroes, with an admixture of Spanish blood. There are practically no pure-blooded



Photo: Visual Education Service

A TYPICAL NORTHWESTERN HOMESTEAD  
Holding down a timber claim in the state of Washington.



Photos: Visual Education Service

**How People Live in Honduras.** Typical homes on a stream near the coast. The government palace in Tegucigalpa. Type of home of the better-class citizens.

Indians, except on the Mosquito Coast. On the north coast, the bulk of the population consists of negroes, employed by the fruit industries. In the less explored regions dwell uncivilized Indian tribes. There are a few Europeans and Americans, who control fruit exports and mining concessions. The natives are very unprogressive.

Instruction is free and compulsory but much neglected, and fifty-nine per cent of the children do not receive instruction. There are some institutions for higher education, including a central university and normal school at the capital. The prevailing religion is Roman Catholic, but all creeds are permitted.

**Climate, Land, and Products.** Honduras is largely mountainous, though unlike its neighbor republics, it contains no volcanoes. It has

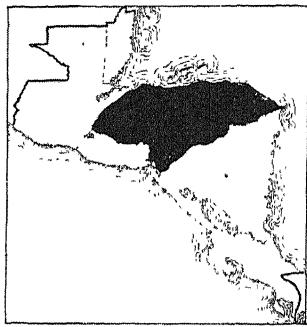
a pleasant, healthful climate except in the low coast lands at the north, which are excessively hot and unhealthful for the white race. Everywhere are rich tropical forests, as yet scarcely exploited. The rainfall throughout the entire

country is heavy, owing to the trade winds. it occupies.

The country is well drained by numerous rivers, most of them flowing into the Caribbean Sea. Nearly all, however, are obstructed by rapids. Of those which are navigable, the Ulua, flowing through the banana lands, and the Segovia, or Wanks, forming part of the boundary with Nicaragua, are most important.

The chief products of the republic, bananas and coconuts, come from the hot Caribbean coastal regions. Nearly 16,000,000 coconuts are exported annually, and most of them, together with other tropical fruits, find a market in the United States. Coffee is cultivated on the slopes, and tobacco of an excellent quality is grown for export. Maize, the principal food crop, beans, wheat, rice, sugar, and plantains are raised for home use. Stock-raising is an industry of growing importance.

The mineral resources of Honduras include gold, platinum, silver, copper, lead, zinc, iron, antimony, and nickel; some minerals are found in almost every part of the country. Among Central American republics, Honduras ranks next to Nicaragua in mineral wealth, but mining industries are only slightly developed.



LOCATION MAP

The illustration shows the position of Honduras with respect to its sister republics, and the proportion of Central America it occupies.

Cigars and straw hats are the only home manufactures exported.

**Transportation and Commerce.** There is no communication by railroad between the Caribbean and Pacific coasts. Transportation is by mule train and ox carts, and the distance of less than 200 miles, which by use of railway could be traversed in half a day, now takes three weeks. Very little is done in the making or repairing of roads. The total length of railway of about 900 miles is used principally to handle the banana crop. In April, 1914, the United Fruit Company offered to pay the government of Honduras \$400,000 cash and \$1,000,000 in forty yearly installments, for the control of the railways for ninety-nine years. This arrangement was made, and under it, four railroads are now operated.

**Government and History.** Under a Constitution adopted in 1894 and revised in 1924, executive authority is vested in a President elected by popular vote for four years. Legislative power rests with a Congress of Deputies chosen by popular vote for four years, in the ratio of one Deputy for every 15,000 people.

Owing to its location, Honduras has been forced to take part in practically every conflict occurring in Central America, and because it has been surrounded by stronger neighbors, it has suffered continually from intervention at their hands.

As with all the republics of Central America, the history of Honduras is one of Spanish rule and oppression, then revolt and freedom, followed by internal dissensions. The principal events will be found in the article CENTRAL AMERICA. See, also, NORTH AMERICA (map).

In 1924, on the failure to elect a President by majority vote, a civil war broke out, and at the instance of the United States, a conference of representatives of the Central American countries was called, and a new election was held. Political disturbances recurred in 1925, but peace was established for the most part.

**The Cities.** Amapala, on the Pacific, and Puerto Cortez, La Ceiba, Tela, and Trujillo, on the Caribbean coast, are the important seaports.

W.W.S.

**Tegucigalpa,** *tay goo se gah'l' pah*, the capital and largest city, is situated on a plain surrounded by mountains, on the Choluteca River, about seventy-eight miles from the Gulf of Fonseca, an arm of the Pacific. It is the center of a fertile agricultural district, the most densely populated in the republic. The most imposing building in the city is the cathedral. There are located here a central university with departments of law, medicine, science, and political sciences, a military school, and a Central Institute for secondary work. A fine ten-arched bridge spans the river and joins Tegucigalpa with its chief suburb, Concepcion. Population about 40,000.

**Related Subjects.** For further information on the subject of Honduras, the reader is referred to the following articles in these volumes:

Banana  
Coconut

Trade Winds  
Walker, William

**HONDURAS, BRITISH.** See BRITISH HONDURAS.

**HONE.** We use hones for sharpening scissors, knives, chisels, razors, and other tools on which we wish to set a fine edge, and we use whetstones for sharpening scythes, axes, and tools whose edge does not need to be so fine. A hone, then, is a stone used for sharpening edged tools. The difference between a hone and a whetstone is in quality only. Whetstones are made of sandstone and are coarse-grained; hones are made of a different stone and are fine-grained. Carborundum (which see) is now used for many of the finest hones, though a clay rock known as novaculite, if of good quality, cannot be surpassed. The finest novaculite for hones is found in Arkansas. A pine log which has been under water long enough to be turned to stone furnishes excellent material for hones, but this source of supply is naturally limited. Oil or lather made from soap should be placed on the hone when it is used.

**HONESTY.** See CHARACTER TRAINING (Duties Owed to Others).

**HONEY.** This is Mother Nature's most delectable contribution to the food of man. To provide it for him, she placed nectar within the flowers, and she taught the honeybee how to convert it into a pleasing and nutritious food [see BEE (The Honeybee)].



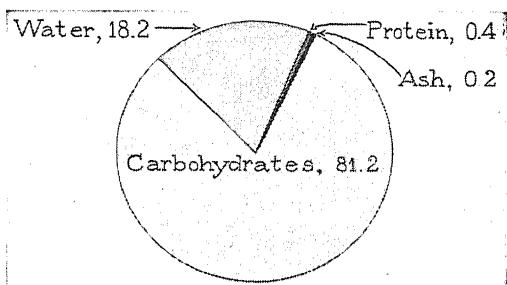
#### PRODUCTION OF HONEY

The above figures for leading states represent averages for a five-year period.

The flavor and color of honey vary according to the flower from which the nectar is obtained, that from white clover being one of the most agreeable of the light-colored varieties. Alfalfa, sage, and orange blossoms are other plants used by the bees. An excellent dark-colored honey is made from the nectar of the buckwheat. Because of its high percentage of carbohydrates (mainly grape sugar and fruit sugar), honey is quite nutritious, but only a small quantity should be eaten at one time, and not oftener

than at three or four meals in a week. In addition to its use as a food, it is often found in cough preparations, and it is also valued for its mildly laxative properties. In Oriental countries, honey is used extensively in making cakes and sweetmeats and in preserving fruit.

The production of honey is an industry of great importance. Over 55,000,000 pounds are produced annually in the United States, and over 6,000,000 pounds in Canada. Germany, Spain, France, Holland, and Belgium



#### COMPOSITION OF HONEY

Its fuel value is 1475 calories per pound, therefore equal to the best round steak as a heat producer.

are important honey-producing countries of Europe. In the United States, coöperative associations have been formed by beekeepers for more efficient methods of marketing the product, and the Department of Agriculture conducts a news service on honey and beeswax in order to provide those interested with reliable information as to prices and market conditions. A detailed account of the honey industry will be found in the article BEE (Bee-Keeping).

As the ancients possessed no other form of sugar, honey was prized very highly by them. To the Hebrews it was the symbol of abundance; Jehovah, in *Exodus* III, 17, gives the promise to Moses that the Children of Israel shall be led from Egypt unto a "land flowing with milk and honey." Many allusions to honey are found in Greek and Roman writings.

Pliny observed that honey sometimes was poisonous, a fact since confirmed by science. Xenophon related that the retreating Greeks at Trebizond ate honey, and that some became intoxicated and others insensible. Though poisonous honey may be very exceptional, when it does exist, it is said to be due to excess production on the part of the bee, and failure of the parts of the flower to develop. The result is an accumulation of by-products in which toxins are found. When nectar is scarce and there is much competition among the bees to secure it, they develop a habit of piercing the tissues of plants in order to secure a supply quickly; this practice results in the formation of poisonous honey.

**HONEY BADGER.** See RATEL.

**HONEY-BLOOM.** See DOGBANE.

**HONEYCOMB BAG.** See RUMINANTS.

**HONEYDEW.** See APHIDES; MUSKMELON.

**HONEY LOCUST, SWEET LOCUST, OR BLACK LOCUST,** a beautiful tree belonging to the same family as the acacias. It is called *three-cornered acacia* in Great Britain, because of the three-pronged thorns on its branches and trunk. In North America, the honey locust grows wild in the Mississippi basin and north to Ontario. It reaches a height of seventy to eighty feet, and is often planted in wind-breaks and hedges. Its hard, heavy wood resists decay and is used for posts and ties. In pioneer days, so the story goes, the settlers made barricades of the spiny trees as a protection against Indian attacks. The seeds of the honey locust, borne in flat pods nearly a foot long, are embedded in a mass of sweet pulp from which the Indians used to make an intoxicating beverage. They are considered good stock food. See LOCUST. G.M.S.

**Scientific Name.** The honey locust belongs to the pulse family, *Leguminosae*, and is related to the carob of the Bible, which bore the "husks that the swine did eat" (see CAROB). The botanical name of the honey locust is *Gleditsia triacanthos*.

**HONEYSUCKLE,** a family of twining plants which bear trumpet-shaped, nectar-filled flowers. Various species are found in temperate zones all over the world. The white-flowered species lure sphinx moths in the night. The bush honeysuckle, with its small yellow blossoms, attracts the bees. With blossoms which are red without and orange-yellow within, the coral, or trumpet, honeysuckle flaunts a flaming invitation to humming birds, calling to them to taste of the sweets it holds. All species have dark-green, oval leaves which are usually very smooth and grow opposite each other in pairs. Sometimes the bases of the leaves are united around the stem, or the woody stem seems to grow through the leaves. Most species of this family are evergreens, or nearly so, and when the petals fall, bright-crimson berries take their places. Many birds eat these berries, and so the seeds are widely distributed. Honeysuckles grow along waysides or in tangled woodlands, or beautify



TRUMPET HONEYSUCKLE

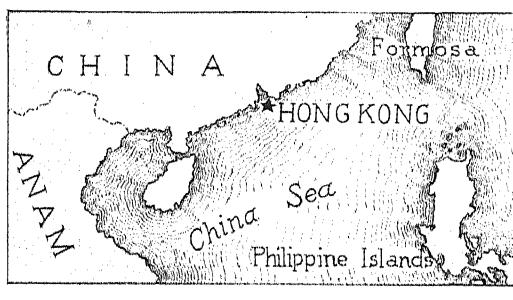
porches, walls, or trellises of gardens. In his *Marmion*, Scott says:

And honeysuckle loved to crawl  
Up the low crag and ruin'd wall.

Honeysuckles are also called *woodbine*, and are said to be the twisted *eglantine* mentioned by Milton in *L'Allegro*. B.M.D.

**Scientific Names.** The botanical name of the honeysuckle family is *Caprifoliaceae*. The bush honeysuckle is *Diervilla lonicera*. The coral honeysuckle is *Lonicera sempervirens*. Other species include the Tartarian, *L. tatarica*, and the fragrant *L. fragrantissima*. Both are widely used in landscaping.

**HONG KONG**, a crown colony of Great Britain, is an island twenty-nine and a half square miles in area, situated off the Chinese mainland, ninety miles south of Canton. The city of Victoria is located in the northwest corner of the island, and the island and town together are commonly called Hong Kong, but that name properly belongs only to the island.



Its location at the mouth of the Canton River and its fine natural harbors have made Hong Kong the chief center of British commerce in the Orient.

Victoria has every appearance of a busy, commercial European city. With its substantial buildings, wide streets, and magnificent harbor, it bears slight resemblance to the typical Chinese city. One feature, however, distinguishes it. A large number of natives live in house boats and comprise a "floating population" found nowhere else in such numbers. The mountainous character of the site has made the city one of terraces, and its appearance from the harbor is most picturesque. Parks and gardens, with the luxuriant vegetation of the tropics, and trees of delicate foliage furnish an attractive setting for the residences which dot the hillsides. There are schools, newspapers, theaters, clubs, hospitals, hotels, a library, a museum, and government buildings—all the facilities for business and social life.

In addition to the island, Britain has obtained by cession a peninsula on the mainland, giving the colony a total area of 391 square miles. More than half of the population of the



Photo: U & U

The Beautiful Harbor of Hong Kong. The observer is looking across the anchorage to the town of Kowloon, on the mainland.



Photo: U &amp; U

FORT STREET, HONOLULU  
Looking north to Pacific Heights.

island is located in Victoria, and it is divided into European and Chinese sections. The white inhabitants for the most part have their homes in the higher parts of the city, thus rendering more endurable the dampness and heat of the tropical summer months.

The chief industries are cotton-spinning, sugar-refining, gold-beating, furniture-making, and cigarette-manufacturing (10,000,000 a day). The imports and exports are valued at more than \$250,000,000 annually. The principal items of trade are tea, sugar, silk, oil, cotton, ivory, granite, vegetables, and livestock.

The colony is administered by a governor, assisted by executive and legislative councils, in which the commanders of the naval and

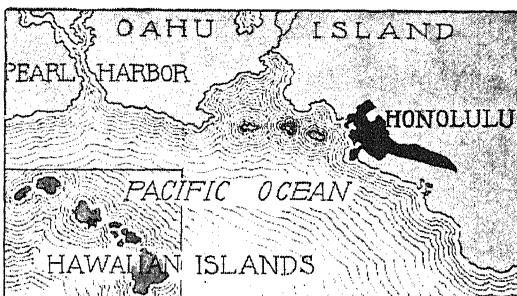
military forces hold important positions. The British originally occupied the island of Hong Kong in 1841, and it was finally abandoned by China by the terms of a charter dated April 5, 1843. The population of Victoria proper is 425,000 native and 16,000 white; entire population of the colony, 625,000.

**HONITON LACE.** See LACE (The Bobbin Process).

**HONOLULU**, *ho no loo' loo*, capital of the Hawaiian Islands, politically known as the United States Territory of Hawaii. The city is situated on a good harbor in the south of the island of Oahu (*o ah' oo*), 2,089 miles southwest of San Francisco. From the position of capital of an uncivilized kingdom of brown people, Honolulu has risen in comparatively

few years to great importance as a meeting point of commercial routes in the Pacific Ocean, and as the most important distant naval station of the United States. The opening of the Panama Canal greatly added to its commercial and strategic value. (See chart, with article UNITED STATES, entitled *Pacific Areas of Control*.)

The harbor of Honolulu, with volcanic peaks rising high behind the town, is very picturesque. The docks and wharves are modern and excellently equipped, electric cars are of most modern design, and there is a modern railroad depot.



LOCATION OF HONOLULU

In the larger map the black area indicates the general form of the city. The star in the corner map shows the location of the city in the Hawaiian group.

The business and residence sections for the whites are like those of any American city of equal size. But the East and the West meet in Honolulu; there are numerous native sections. Costumes of latest fashion are seen in the streets, mingling with the *holokus* worn by the native girls. The holoku is a very ill-fitting garment resembling the "Mother Hubbard," the first costume prescribed for the natives by missionaries in the days when dress of any kind was considered unnecessary. Wooden houses still stand side by side with brick and stone buildings six stories in height, but there is practically no poverty in the city. There are hospitals, a public library, a territorial university, and two industrial schools—one for young people of each sex.

The chief industries are the manufacture of machinery, especially that used in sugar-refining; rice-milling, pineapple-canning, and shipbuilding. The government buildings are large and handsome; the governor of the territory occupies the palace of the former Hawaiian ruler. For more detailed information relating to the surroundings of Honolulu, see HAWAII. Population in 1920, 83,327; in 1926, 104,300 (Federal estimate).

**HONOR.** A fundamental principle of an upright character is that composite virtue we call *honor*—a virtue that implies loyalty and courage, truthfulness and honesty, trustworthiness and self-respect, justice, generosity.

No wonder it has been said that "Honor guards the way of life from all offense, suffered or done."

The man of honor keeps faith, not only with others, but with his own best self, recognizing what is right and due, and "daring to be true" to that ideal, both in word and action. He scorns cheating, lying, thievery, bribery—dishonesty in all its disguises. He is scrupulous in living up to his promises, whether written or oral, so that men say of him that "his word is as good as his bond." He is prompt and direct in the discharge of duty. If his work makes him a servant of the public—soldier, doctor, captain, engineer, switchman, telegraph operator—he is faithful in the performance of his task, even at the risk of his own life. "The post of honor," says Carlyle, "is the post of difficulty, the post of danger—of death, if difficulty be not overcome"; and the honorable man, sooner than desert that post, is ready to say, with Addison, "Better to die ten thousand deaths than wound my honor."

A high conception of honor makes a man do more than the careless world expects of him. It makes a Walter Scott or a Mark Twain, for instance, labor loyally for years to discharge the claims of creditors when a business venture meets with disaster. It enables a man to resist the temptation to accumulate money by dishonest methods, or secure an advantage of any kind through means which conflict with his ideas of what is honorable.

It is a keen sense of honor that makes people tell the truth when a falsehood would save them from a disagreeable situation; that keeps them faithful to their work when there is no one near to watch, or when their neglect would never be discovered. The honor strong enough to withstand a temptation that whispers "No one will ever be the wiser," is an honor which has been put to the supreme test. Says a poet:

Do what thy manhood bids thee do;  
From none but self expect applause;  
He noblest lives and noblest dies  
Who makes and keeps his self-made laws.

**Cultivating the Sense of Honor.** Children can be educated to be honorable in all their actions, and to consider themselves disgraced by anything that is mean or cowardly. They should early be taught the lesson that a lie dishonors them, that breaking a promise is equivalent to lying, that violating a confidence is disloyal.

They should be trained to regard a neglected duty as something dishonorable. The first step in educating children to fidelity in the performance of their duties is to hold them responsible for certain simple home tasks, making it plain that they are being trusted to do the work, and then praising them warmly for faithfulness and promptness. Such respon-

## Outline on Honor

### Motto:

"Come what will, I will keep my faith with friend and foe"—LINCOLN

### Essay on Honor

- (a) The bigness of the term
- (b) Requirements of personal honor
- (c) Official honor and its obligations
- (d) What "national honor" means

### Biography.

|                           |                     |
|---------------------------|---------------------|
| Cicero                    | Thomas Jefferson    |
| Mark Twain                | John Bright         |
| Sir Walter Scott          | Abraham Lincoln     |
| Thomas Babington Macaulay | Benjamin Franklin   |
| William Penn              | Jefferson Davis     |
| George Washington         | Alexander Mackenzie |
|                           | zie                 |

### Poems to Memorize:

- Speech of Polonius to Laertes—Shakespeare's *Hamlet*
- The Lost Leader*—Robert Browning
- A Short Sermon*—Alice Cary

### Supplementary Reading.

- Regulus*—Thomas Dale
- Story of *Damon and Pythias*
- The Pied Piper of Hamelin*—Browning

### Quotations:

A hundred years cannot repair a moment's loss of honor. —Proverb.

A thread will tie an honest man better than a rope will do a rogue. —Scottish saying.

Honor is like an island, rugged and without shores; we can never reenter it once we are on the outside. —BOILEAU.

The air for the wing of the sparrow,  
The nest for the robin and wren;  
But always the path that is narrow  
And straight for the children of men.  
—ALICE CARY.

A brave man hazards his life but not his conscience. —Proverb.

Not gold, but only men can make  
A people great and strong;  
Men who, for Truth and Honor's sake,  
Stand fast and suffer wrong.  
—EMERSON.

Be true to your word, your work, and your friend.

Our friends see the best in us, and by that very fact call forth the best from us. —BLACK.

To thine own self be true,  
And it must follow as the night the day,  
Thou canst not then be false to any man.  
—SHAKESPEARE.

A man dishonored is worse than dead.  
—CERVANTES.

sibility and confidence, linked with appreciation, are as flattering and stimulating to children as to older folks. By following this plan, even the boy or girl who is naturally careless and undependable can be "trusted" into a lively sense of honor regarding any work that is undertaken. It is as George Eliot wrote—"Those who trust us educate us."

More and more, the "honor system" is being put into practice in the general educational process. Parents and teachers are coming to see that it pays to appeal to the child's honor—that the child responds more quickly to trust than to coercion. The boy who is put "on his honor" not to cheat in an examination and then freed from distasteful policing as he prepares his paper; the girl who at home is "bound in honor" to speak the truth on all occasions and whose statements are accepted without question; the pupil who is entrusted with school or personal property and made to feel the confidence that is thereby reposed in him—all such are receiving practical, everyday lessons in honor. Knowing that they are being implicitly trusted, that there is no danger of being found out and punished, they are ashamed to do the dishonorable things which, under the old plan of suspicion and supervision, might not have caused them a moment's hesitation or worry. Wise, indeed, is the saying of George MacDonald, that "to be trusted is a greater compliment than to be loved."

The boy whose early education has laid such a foundation in honor is in a fair way to develop into the sort of man to whom the "graft" that pollutes our business and political life stands as a thing unclean; who will neither sell his vote, bargain for favor, scant his work, nor resort to petty trickery and deceit to gain success. He will set too much store by his "honor bright" to be willing to stain it in the slime of corrupt methods. See CHARACTER TRAINING (Duties Owed to Others); DISHONESTY IN CHILDHOOD.

**HONOR, LEGION OF.** See LEGION OF HONOR.

**HONOR, TITLES OF.** See TITLES OF HONOR.

**HONORIUS.** See BYZANTINE EMPIRE.

**HONSHU, ISLAND OF.** See JAPAN (Location and Size).

**HOOD, JOHN BELL** (1831-1870), an American soldier, born in Owingsville, Ky. He was graduated from West Point in 1853, then served in the United States army until the outbreak of the War of Secession, when he joined the Confederate forces. His bravery in the Virginia campaigns during the first years of the war secured rapid promotion. He commanded a division of Lee's army at Antietam and at Gettysburg, and led a brigade under General Bragg at Chickamauga, where he lost a leg. Afterward he became lieutenant general and served in the Atlanta campaign under General Johnston,

whom he succeeded in command of the army opposing General Sherman in Georgia. Abandoning the defensive policy of his predecessor, he vigorously attacked Sherman, was repulsed with severe losses, and compelled to retire from Atlanta. He was again defeated at Franklin, Tenn., but moved on to Nashville, where, on December 16, 1864, he was routed by General Thomas. At his own request, he was then relieved of his command. At the close of the war, he became a commission merchant in New Orleans. See WAR OF SECESSION.

**HOOD, MOUNT**, an extinct volcano in the Cascade Range in the northern part of Oregon, and about thirty miles south of the Columbia River. It rises to a height of 11,225 feet, and has many glaciers on its slopes and some high precipices. It has not been active within the memory of man. A magnificent view of the surrounding country is obtained from the summit, which is easily reached by good climbers.

**HOOD, ROBIN.** See ROBIN HOOD.

**HOOD, THOMAS** (1799-1845), an English poet and humorist, whose best-known poems, *Song of the Shirt* and *The Bridge of Sighs*, are among the most perfect expressions of love and pity for suffering humanity that can be found in English literature. Hood began his literary career by writing articles for a local paper and a magazine in Dundee, and in 1821 became assistant editor of the *London Magazine*, on the staff of which were also Charles Lamb, William Hazlitt, and Thomas De Quincey. Nine years later, he began the publication of the *Comic Annual*, for which he wrote some of his most humorous productions. This was succeeded, in 1838, by a monthly periodical called *Hood's Own*.

In his fondness for punning, Hood sometimes went to extremes, but when he is at his best his writings show an admirable blending of humor and pathos. Shortly before his death he established *Hood's Magazine*. It was in his last illness that he wrote his imperishable *Bridge of Sighs* and *Song of the Shirt*.

**Other Works.** Among other writings are the remarkable poem *Dream of Eugene Aram*; *Tylney Hall*, a novel; *National Tales*, a collection of short stories; and *Whims and Oddities*.

**HOOGHLY RIVER.** See HUGLI RIVER.

**HOOKAH.** See PIPE.

**HOOKER, JOSEPH** (1814-1879), an American soldier popularly known as FIGHTING JOE, on account of his daring and his soldierly qualities. After graduation from West Point, in 1837, he joined the artillery and served in Florida and on the Maine frontier from 1837 to 1840. During the Mexican War, he was successively advanced to the rank of captain, major, and lieutenant colonel. In 1853 he retired from the army and devoted his attention to civil engineering.

When the War of Secession began, Hooker was appointed brigadier general of volunteers, and major general in the following spring. During the Peninsula Campaign, at South Mountain and at Antietam, he fought with distinction, and in 1863 was placed in command of the Army of the Potomac. At Chancellorsville, May 2 to 4, 1863, he met with a crushing defeat which critics say was entirely due to his inability to make quick decisions. He was succeeded in command by General Meade, but he later distinguished himself in the "Battle above the Clouds" (Lookout Mountain), while fighting under Rosecrans. In recognition of Hooker's services in that struggle, he received the rank of major general in the regular army. Joining Sherman, he distinguished himself in the attack on Atlanta; this was his last military service. See WAR OF SECESSION.

**HOOKER, MOUNT**, one of the highest elevations of the Rocky Mountain range in Canada, on the boundary between the provinces of Alberta and British Columbia. Mount Hooker, together with a near-by peak, Mount Brown, was first reported by David Douglass, an English botanist, when he traveled through that country in 1826. Hooker was named for two mountain-climbing scientists of the party. The mountain rises to a height of 10,505 feet, but at one time, before accurate measurements were taken, it was supposed to be over 15,000 feet high. The mountains in its vicinity in British Columbia contain gold, lead, copper, silver, and coal.

**HOOKWORM**, an animal parasite that enters the human body through the skin, and attaches itself by minute hooks to the mucous membrane of the small intestine. The various mental and physical ills caused by this parasite constitute the symptoms of hookworm disease. Eggs produced by female worms in



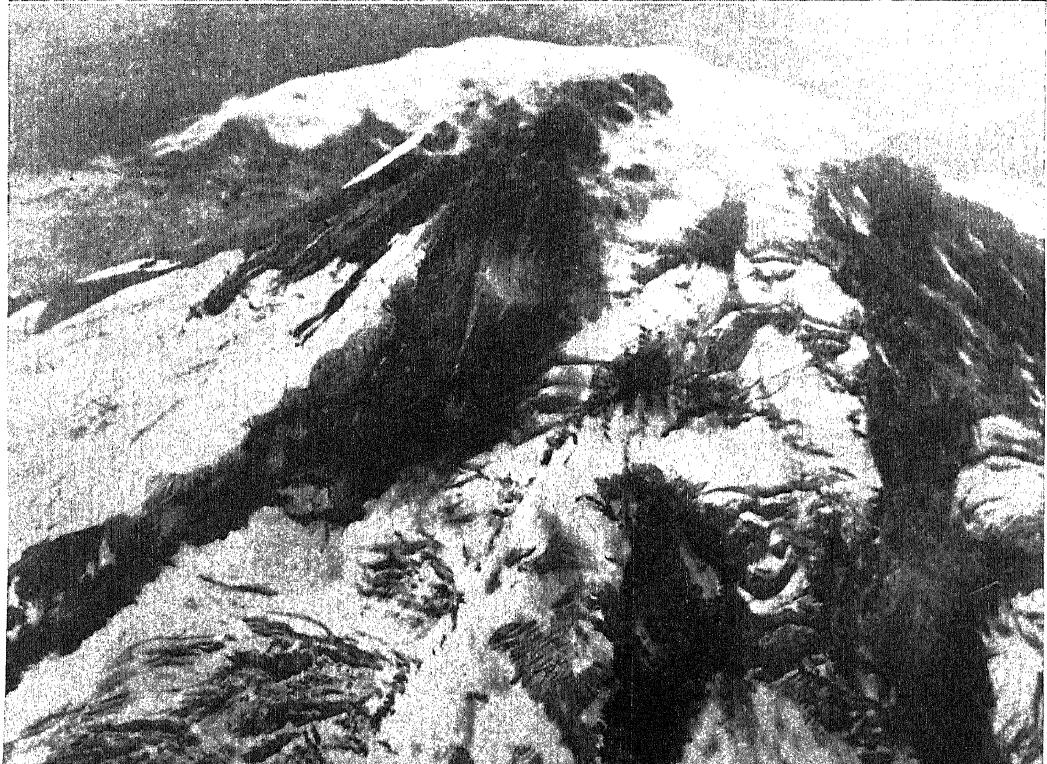
Photo: Brown Bros.

THOMAS HOOD



Photo: Brown Bros.

JOSEPH HOOKER



Photos; P & A; Oregon Journal

**Majestic Mount Hood.** Above, view from the Loop Highway, which encircles the mountain. Below, an airplane, flying close to the summit, secures an interesting picture.

the intestine pass out of the body in the feces. Under suitable conditions of heat and moisture, the larvae hatch in enormous numbers, and infest the soil in regions of backward sanitation, where human discharges are deposited on the ground. The larvae, having become encysted, penetrate the skin of the feet and legs of persons walking barefooted in such localities, and the majority of cases are acquired in this manner. However, water, food, clothing, or any other article polluted by human discharges may be a source of infestation. In Europe, especially, miners, brick and tile workers, and others whose labor requires skin contact are prone to this disease. The trouble is common in tropical and subtropical countries all over the world, and in the mines of colder countries. Its prevalence in the Southern United States was at one time so serious as to engage the attention of the United States Health Service. As many as 2,000,000 cases of hookworm disease existed at one time, but vigorous measures have lessened the number.

**Transmission.** Rarely, the larvae enter the body by way of the mouth through eating and drinking of polluted substances; in the great majority of cases, they enter through the skin. Finding entrance into the lymph vessels, they travel through these to the veins, by which they reach the right side of the heart. From there they travel to the air spaces in the lungs, are carried to the mouth through the bronchi, trachea, and larynx, and are swallowed. When mature, the parasites attach themselves to the wall of the small intestine and begin sucking blood. The period from entrance to maturity is four to six or ten weeks.

**Symptoms.** There is an eruption of the feet which goes by such names as *ground itch*, *dew poison*, and *toe itch*. The more important symptoms are those which are the constitutional effects of the worm and its poison. Whenever there are large numbers of these worms in the intestine, an anæmia develops, and it may become profound. The child (for children are more affected than adults) becomes pale and pasty. His abdomen is large. He may have puffs under his eyes, and, in an extreme case, dropsy in his legs. He becomes lazy, indifferent, and dull. He is weak, easily tired, and without endurance.

**Cure and Prevention.** Thymol was a standard remedy for hookworm disease before the World War, and oil of chenopodium was used when the war made the former medicine scarce and expensive. Both drugs have to be given repeatedly and are extremely disagreeable to take. About 1921 Dr. Maurice C. Hall, of the United States Bureau of Animal Industry, introduced a new remedy—carbon tetrachloride. One dose, administered properly by a physician, rids the system if the intestinal

tract is cleaned out first by a laxative. The medicine has little taste or odor, is inexpensive, and its use is uniformly successful. Proper sanitary measures, especially the sanitary disposal of human feces, will rid any community of hookworm disease. In localities where the standards are low and disease prevails, people should not go about barefooted, and water for drinking and household purposes should be boiled. Miners and other workers exposed to hookworm infestation should observe sanitary rules and be careful to wear shoes. In the Southern states, in part as the result of control measures, hookworm disease has become comparatively unimportant except in those regions where the soil is sandy. See ZOOLOGY (How Zoölogy Affects Human Welfare); PARASITIC DISEASES.

W.A.E.

**HOOPOE,** *hoo' poo*, the name applied to certain unusual birds widely distributed throughout the warmer parts of Europe, Asia, and Africa. The

name refers to their characteristic cry. The best-known species is the *common hoopoe* of Europe, which is about twelve inches long. It has a slender, sharp bill and a crest formed of two parallel rows of feathers which it can erect at will. Its general color is



THE HOOPOE

buff, with black and white markings on wings and tail. The hoopoe feeds on insects, and makes its nest in a hole in a tree or wall; its eggs are white. The hoopoes belong to the same order as the hornbills (see HORNBILL).

D.L.

**Scientific Name.** Hoopoes belong to the family *Upupidae*. The common hoopoe is *Upupa epops*.

**HOOSAC MOUNTAINS.** See GREEN MOUNTAINS.

**HOOSAC TUNNEL**, the first important tunnel constructed in America, is more than four miles in length. It pierces the Hoosac Range in Massachusetts, and extends to North Adams. Active tunneling was commenced in 1855, and was completed in 1873. The tunnel contains two tracks, and is twenty-four feet wide and twenty-two feet eight inches in height. Work was commenced at the same time at both ends, and also from a shaft sunk to a depth of 1,028 feet, in the center. This shaft is now used for ventilation, and affords a good supply of fresh air. The boring of the

tunnel was a difficult undertaking, as the rock penetrated was chiefly schist. In the process, air drills and nitroglycerine were used for the

first time in America, for tunnel construction.

**HOOSIER**, *hoo' zhur*, STATE, a popular name for Indiana (which see).



### The STORY of HERBERT HOOVER

# H

**H**OOVER, HERBERT CLARK (1874- ), the first Quaker and the first mining engineer to be chosen President of the United States. Until 1914 Hoover was practically unknown outside of engineering circles. He did not reach the Presidency through successive steps in political office, as has been the rule, with few notable exceptions. He won the confidence of the people, not only at home but throughout the world, by unremitting service to humanity in Europe through nearly three years of the World War; when the United States entered the war, he was called home to assume charge of a vast program of food conservation, in order that the American army in France might be fed and that non-combatants in the warring nations of Europe might be kept from starvation [see WORLD WAR (Citizen Soldiers at Home)].

Then, as Secretary of Commerce in the Cabinets of two Presidents, he demonstrated extraordinary capacity in an executive department of the government. This was the only political office he ever held previous to his inauguration as thirty-first President of the United States.

**His Early Life.** Herbert Hoover was born in the small village of West Branch, Ia., on August 10, 1874, of Quaker parentage. He was the seventh of the Hoover line which descended from Andrew Hoover, who emigrated from Germany with his parents in 1730. Thus, for two hundred years, the Hoovers have been a part of American life.

The record of the family in America with respect to President Hoover is as follows:

Andrew Hoover, born in Germany; emigrated in his youth to the English colonies in America. Married

in Pennsylvania to Margaret Fouts about 1740. Died in early part of nineteenth century.

Andrew Hoover, Jr., born in 1751 in North Carolina. Married a daughter of Rudolph Waymire. Died in White Water (Richmond), Ind. (date missing).

John Hoover, born in North Carolina. Married in that state to Sarah Burkett. Died at West Milton, O. (date missing).

Jesse Hoover, born 1790, on Huwarrie River, North Carolina. Married in 1819 to Rebecca Yount, at West Milton, O. Removed to Iowa in 1854. Died November, 1856, at West Branch, Ia.

Eli Hoover, born at Miami City, O., October 6, 1820. First married to Mary Davis, and after her death, on March 3, 1852, married to Hannah Leonard. Eli Hoover died July 24, 1892, at Hubbard, Ia. (Herbert Hoover's grandmother was Mary Davis.)

Jesse Clark Hoover, born September, 1847, in Miami County, Ohio. Married to Hulda Randall Minthorn. Died December, 1880, at West Branch, Ia.

Herbert C. Hoover, born August 10, 1874, at West Branch, Ia. Married in 1899 to Lou Henry, daughter of an Iowa banker, at Monterey, Calif.

A small frame house which stands to-day in West Branch, a farm of a few acres, and a name that was associated with respectability were all that Jesse Hoover left to his sons. Herbert was six years of age when his father died; his mother died when he was ten. The very small estate was sold, and the proceeds were placed in trust for him and his brother. (The latter, Theodore Jesse, is now dean of engineering at Stanford University.) As long as he was entirely a dependent, he made his home alternately with two of his father's brothers, in West Branch and in Oklahoma.

When he was thirteen, he undertook a great adventure—a trip to Oregon, to live with

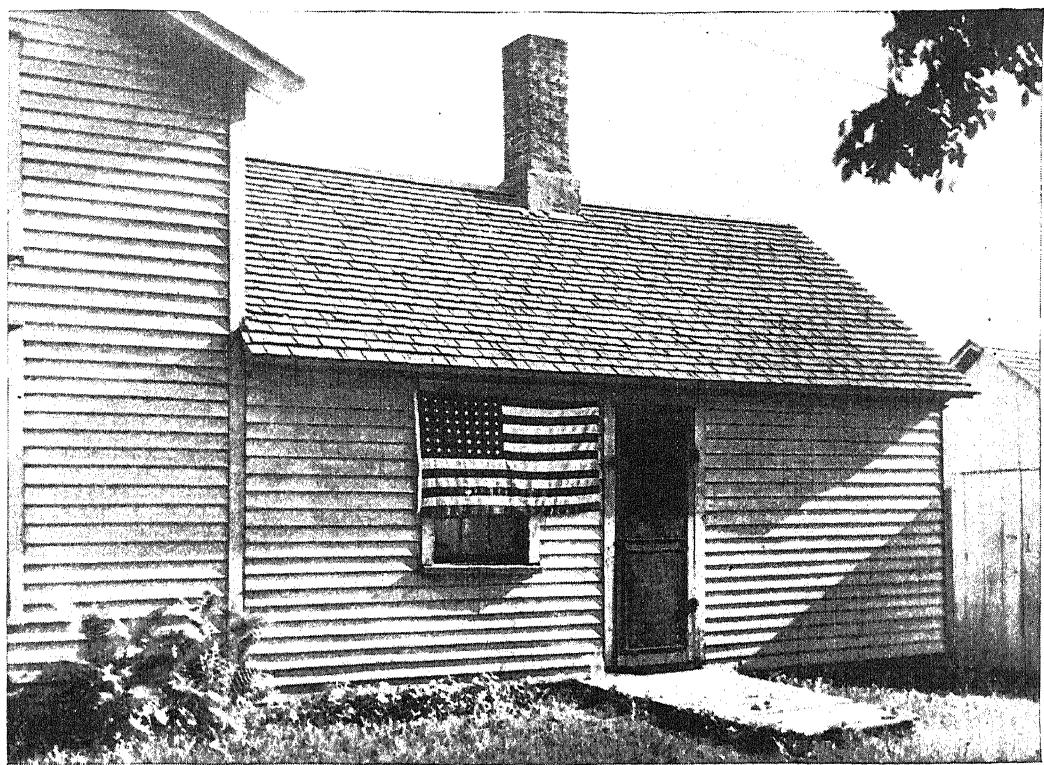


Photo: P &amp; A

THE BIRTHPLACE OF THE THIRTY-FIRST PRESIDENT

another uncle, a Dr. John Minthorn, also a Quaker, and a brother of Herbert's mother. Here the boy invested what remained of his part of the Iowa property (\$60) in a business-college course, then found employment in a real-estate office. When Leland Stanford Junior University was organized, he was one of the first students to matriculate. This country boy was then seventeen years old—a chubby, pink-faced lad who stood in awe of new surroundings. He went to Stanford to learn engineering, and was graduated in 1895.

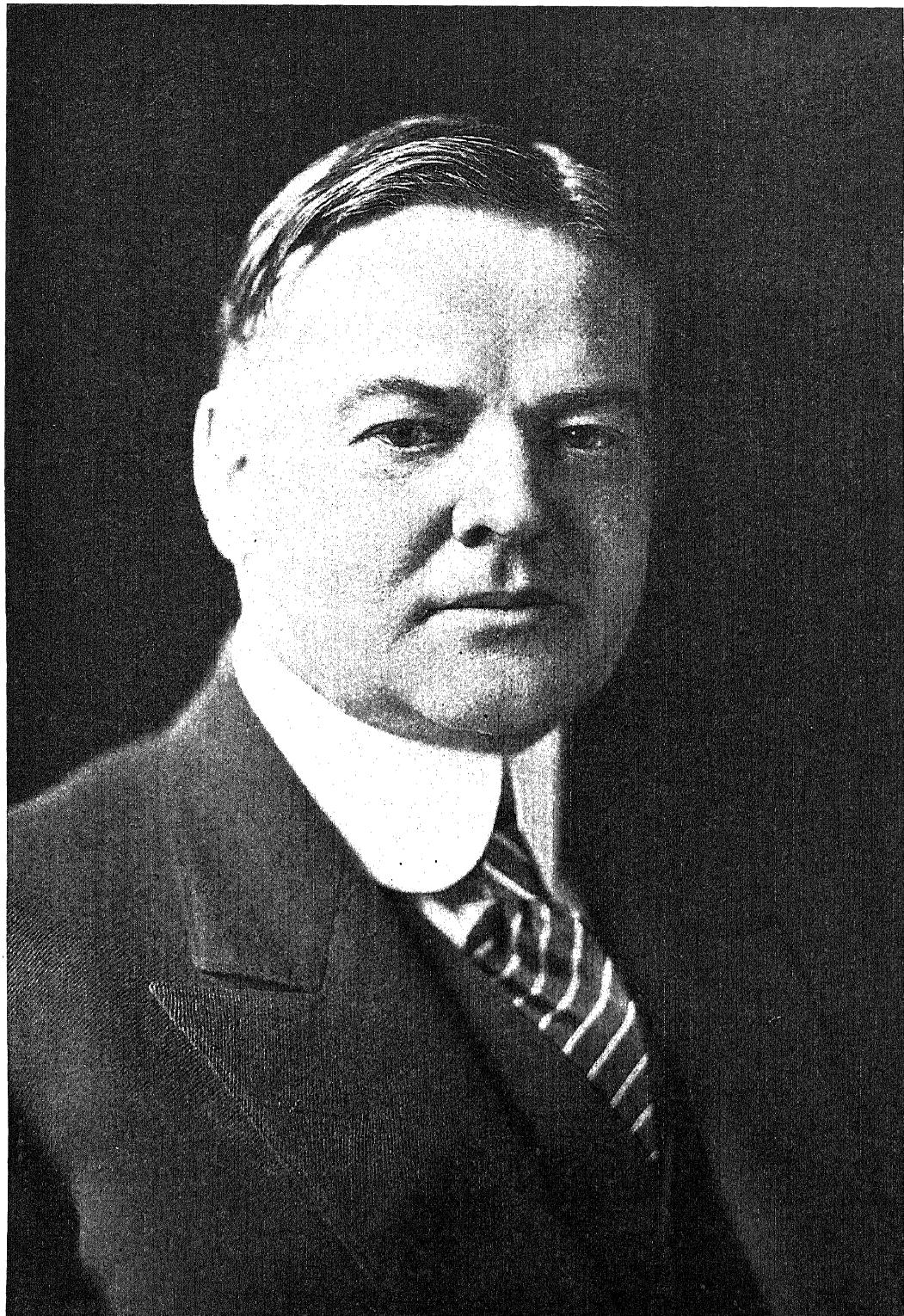
When he left the university, practically penniless, he sought work along the line of his profession. To get practical experience, he learned in a California mine that pushing a wheelbarrow is arduous work; this was his earliest task as an engineer. Having absorbed all he could of knowledge at that mine, he allied himself with a leading San Francisco engineer; he desired a position in which his technical knowledge could be used, but was obliged to start as a clerk. He was soon promoted to engineering tasks.

**Begins a Notable Career.** In 1897 his employer sent him on a mission to investigate a mining enterprise in Western Australia, for London owners. In less than a year he became manager of the property on the other side of the world, after severing his San Francisco con-

nexion; he was thus embarked on an engineering career which was destined to lead him into many countries. What were probably his most dreadful experiences were encountered in Australia. For eighteen months he worked in a semi-arid region, with temperatures above 100° continuously for months, and where all water was surface water, and it was scarce.

There was a prospect of assured future success when this mining engineer received an offer to go to China as chief engineer of the Chinese Imperial Bureau of Mines. He promptly accepted the post, but did not desire to go alone. Back in California, he had left a young woman who had been a fellow student at Stanford University; her interest in geology was as intense as his own, and they found that they shared in common practically every other interest. He cabled her the news of the offer from China and asked if she would go with him. When her answer reached him, he sailed for home, in January, 1899, and was married.

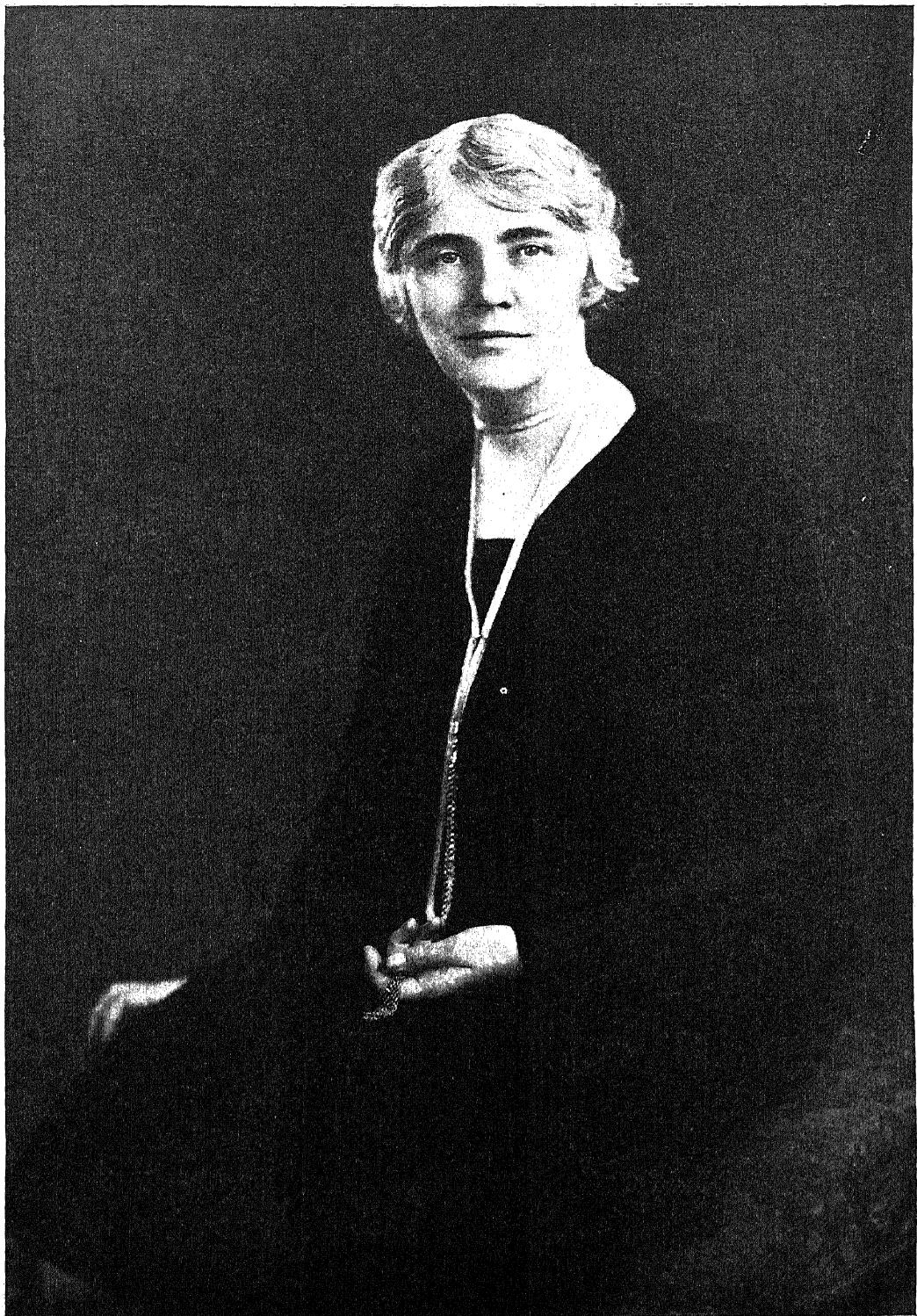
Miss Lou Henry lived in Monterey, Calif., where her father was a banker. The Henry family were Episcopalians; Hoover was a Quaker. But in Monterey at that time there was no established Protestant church. It was an old Spanish mission town, and the Franciscan Order of the Roman Catholic Church



3228

HERBERT CLARK HOOVER

Photo: U & U



LOU HENRY HOOVER

Photo: U & U  
3229

had alone administered to the spiritual needs of the incoming settlers of Protestant faith. The ceremony which united Hoover and Miss Henry in marriage was performed by the local Catholic priest, who held from his Church a permanent dispensation for the marriage of non-Catholics. Thus were sectarian lines overridden. Mrs. Hoover later joined her husband's Quaker communion.

**The World His Field.** In China the Hoovers were thrust into an unexpected danger, the Boxer Rebellion, and it was in connection with that uprising that the engineer acquired his first experience as a food administrator. When white people fled to the foreign concession in Tientsin for safety, and were there held in a state of siege, it fell to the lot of Hoover to use his influence with the government to secure for the besieged the necessities of life; it was a task fraught with difficulty and danger. Mrs. Hoover, keenly alive to the peril that threatened, found herself one of the few women leaders who strove to maintain a high morale under distressing conditions.

As soon as the Boxer rising had been put down, the Hoovers returned to California by way of London. They were at home only a few months, then went back to China, where Mr. Hoover was employed in modernizing the operations of a coal mine. In 1903 he joined a firm of mining engineers in London, and became its head. For the next eleven years he was immersed in the duties of his profession. He was again in Australia, on mining business, and in developing a new zinc industry. Then he was engaged on contracts which carried him, in turn, to China again, to Nicaragua, California, Mexico, Alaska, South Africa, Belgium, and Borneo. Besides, he constructed railways and smelters in Burma, and there built barges to handle rough ore. In Russia he reclaimed a vast estate as large as the states of Illinois, Indiana, and Ohio, where, through bad management of great natural resources, the population had become impoverished and demoralized.

**One Career Ended; Another Begun.** Then came the year 1914. Hoover was back in California, where, in San Francisco, he had established his own organization. Here he hoped to live for the remainder of his life; subordinates could be sent on missions. But another call, not associated with his profession, came to him. Because of his European connections, he was chosen by the directors of the Panama-Pacific Exposition to go to London and solicit the coöperation of European governments in the great fair planned to be held in San Francisco in 1915.

Then came the early days of the World War. His mission ended abruptly, for Europe was confronted with matters more vital than expositions. The Hoovers planned to leave for

home in August; their steamship bookings had been secured, but they found themselves in the position of some 200,000 other Americans in Europe. The swiftly moving war caused the cancellation of bookings, letters of credit, and every other device needed by the sorely tried Americans. It was Hoover who, in answer to the appeal of the ambassador of the United States in London, was successful in getting most of the stranded Americans home. He was able to arrange loans where they were needed, and to secure steamship accommodations.

The Belgian people were in direst straits. Their country was largely in the hands of the invaders, their government had fled to the Channel coast, and more than 7,000,000 faced starvation. At the instance of Walter H. Page, United States ambassador to Great Britain, Hoover was literally drafted to secure food for them. For two days he hesitated to accept the task, he would have to abandon his profession at the height of his career, sacrifice further opportunity to amass wealth, and possibly fail in the humanitarian endeavor. But he accepted, and from October, 1914, to April, 1917, when the United States entered the war, Hoover was in and out of Belgium, Great Britain, France, and his own country, passing through the German U-boat blockade sixty times on the Atlantic Ocean and the North Sea, and giving his time entirely to the acquisition and distribution of food.

**Honored in Belgium.** When the war ended and the Belgian government had returned to Brussels, King Albert in a formal ceremony thanked the allied nations for the service they had performed in behalf of his stricken country. In the throne room he sat with the royal family. Before him at his left stood the powerful men who had guided the allied powers—Clemenceau of France, Lloyd George of Great Britain, Orlando of Italy, and Wilson of the United States. An eyewitness described a part of the ceremonies:

Albert thanked each nation in turn. When he addressed President Wilson, he concluded his remarks with these words;

"And the greatest gift of America to the cause of world peace was Herbert Hoover."

Wilson bowed his acknowledgment of the compliment, although at that time he and Hoover were not on the best of terms. The king paused, and peered the more closely at the little group of Americans with Wilson.

"But," said Albert, "where is Mr. Hoover?"

There was a commotion in the group that included the household. Hoover, red-faced, unable to find a place to put his hands, was pushed to the front.

"As usual," the king smiled, "hiding from thanks."

Recognition of the food administrator who had saved millions of lives took on a more public aspect. He was made "Honorary Citizen and Friend of the Belgian Nation"

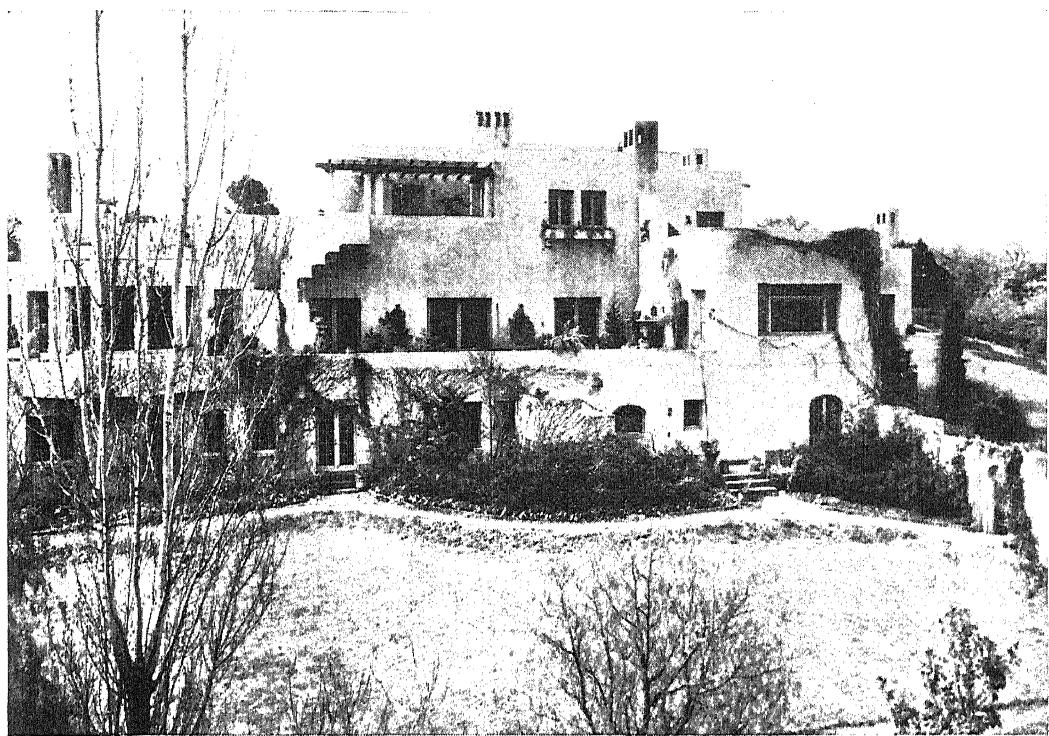


Photo: U &amp; U

## THE CALIFORNIA HOME OF THE HOOVER FAMILY

It overlooks the campus of Stanford University. The three terraces command views of the campanile of the University of California and the clustered lights of several towns at night. The building was designed by Mrs. Hoover.

by proclamation of the government, and "accorded a place of honor in the Belgian family, over which he has been the agent of Providence."

During the long period of administration of Belgian relief, the total expenditure of a billion dollars was so efficiently and honestly accounted for that there was established a record of public relief that probably will never be equaled. Hoover was obliged to raise most of the money himself; he had to secure the coöperation of enemy nations when war hatreds were at their height; he had to have ships when they were at a premium; but he accomplished the tremendous task and won the world's admiration.

**Called to Home Fields.** In 1917 Hoover was detached from the foreign field and ordered to service in Washington. He was appointed to administer the United States Food Administration Bureau, and was given wide powers. In order to feed a large part of Europe, it was found necessary to conserve food—to limit home consumption of certain staple products. "Meatless days" were instituted; flour was conserved; sugar consumption was greatly reduced. There were few people so unpatriotic as to protest against curtailment of supplies for their dinner tables; the term "Hooverizing"

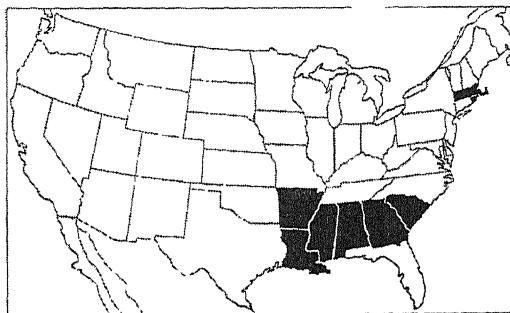
was applied to the reasonable sacrifices that were necessary.

In 1919 Hoover was sent back to Europe to feed hungry millions in allied and former enemy countries. This work carried him into France, Belgium, Germany, Austria, Hungary, and Poland. In view of the religious phase of the political campaign from which he emerged as President-Elect, it is interesting to note that the Pope in Rome possesses a certain photograph which it is known he values highly. In it are shown three persons who worked together for the relief of the hungry population around Warsaw; one of them is Cardinal Ratti, who is now Pope, and standing next to him is Herbert Hoover.

**Enters the Harding Cabinet.** In 1921 President Harding selected Hoover to be Secretary of Commerce, because of his record of accomplishment and his intimate knowledge of the world's business trends. Hoover's friends feared that by his acceptance of the post he had taken a step backward in his career, for in the light of accomplishment, the Department of Commerce was not particularly well regarded. Hoover was retained in the post by President Coolidge, and during the nearly seven and a half years of his incumbency,

it became one of the most important of the executive departments of the government. The year before the date of the national convention which named him for the Presidency, he gave effective service in the South during the very disastrous floods along the Mississippi River; Southern people welcomed him as a representative of the government who possessed engineering knowledge which could be applied to prevent future like disasters.

**Candidate for President.** In 1920, while the world was yet applauding the work of Hoover in the World War, a few of his friends put his



ELECTION MAP, 1928

The states shown in light shade cast their electoral votes for Herbert Hoover. The black areas represent the states whose vote was given to Alfred E. Smith.

name before the Republican national convention as a candidate for the Presidential nomination. The effort caused scarcely a ripple on the surface of the convention's affairs. In 1924 no effort was made in his behalf, for the nomination was conceded to President Coolidge.

The silence of Coolidge as to his wishes in connection with the nomination in 1928 discouraged all other potential candidacies. Coolidge had said, "I do not choose to run for President in 1928," but, nevertheless, there appeared to be strong sentiment in his favor. When, early in the convention year, it became evident that Coolidge had put himself definitely out of the race, other candidates sought support. Among the leaders were former Governor Frank O. Lowden of Illinois, Secretary Hoover, Senator Charles Curtis of Kansas, and Senator James Watson of Indiana.

Before the meeting of the national convention of the party at Kansas City, the nomination of Hoover was assured; many state primaries had caused the state delegates to be pledged to him, and a sufficient number of unpledged delegates were known to be favorable to him to give him nearly a unanimous convention vote. Senator Curtis, one of the aspirants for first place on the ticket, was nominated for Vice-President.

**The Election of 1928.** Hoover was confronted by an opponent of outstanding personal

popularity. Alfred E. Smith of New York had repeatedly been elected to office in his state; when he was nominated by the Democrats for the Presidency, he was completing his fourth term as governor, and his administrations had been highly creditable. However, in the national field he failed to hold the support of a united party, with the result that Hoover was chosen by an electoral vote that was more nearly unanimous than at any other Presidential contest since 1820, when, during the "era of good feeling," James Monroe received all but one of the votes of the Electoral College.

[George Washington received the unanimous vote of the Electoral College. James Monroe would have been given the same unique distinction had not one member voted against him because, in his opinion, no other man should receive the same honor that had been accorded to the "Father of his Country." The single dissenting vote was cast for John Quincy Adams.]

The Hoover popular majority was 6,356,849 votes; his total vote in the Electoral College was 444, contributed by forty states. Governor Smith won in only eight states, whose strength totaled eighty-seven electoral votes.

[Never before in the nation's history had so many votes been cast in a Presidential election. In 1920 the total vote was 26,742,313, Harding's plurality was 7,004,847. In 1924 the total vote was 29,022,261; Coolidge's plurality was 7,330,417. The total vote in 1928 was about 37,000,000, and while Governor Smith lost overwhelmingly in the Electoral College, he polled a greater vote than any other Democrat ever received. His vote was 15,042,366, and Hoover's, 21,409,215. The vote of the minor parties was inconsequential.]

In this election, for the first time since the War of Secession and reconstruction days, the traditional "Solid South" was broken. Of the states included in this group, which had without exception given their electoral vote to the Democratic party for more than sixty years, Virginia, North Carolina, Florida, and Texas chose Republican electors. Tennessee, Kentucky, and Maryland also voted Republican, but each had done so in at least one previous contest.

In seeking reasons for the size of the vote in Hoover's favor, cross currents of circumstances appear. Some of these never showed in the careers of other public men who have reached the Executive Mansion in Washington. Indeed, a number of experiences which have been considered essential to the qualifications of a President were absent in the career of Hoover, and many politically wise men emphasized the lack of them as arguments against the validity of his claims to public support:

(1) For many years he was absent from the United States, returning only for brief periods; he was out of touch with American thought, and understood other nations better than he knew his own country.

Such opinions were advanced to discourage whatever political ambitions he may have entertained.

(2) Hoover's allegiance to the Republican party was questioned by many politicians; it was charged that he was as much a Democrat as a Republican. Indeed, in 1920, he received support, unknown to himself, for the Democratic Presidential nomination from the state convention of Michigan Democrats; they did not know his political affiliations, but favored him because of his public record.

(3) Hoover never voted until 1900, when, during one of his rare periods at home, he participated in a state election in California. He did not vote at a Presidential election until 1920.

(4) He had never held a public office through election, and it was charged, therefore, that he lacked the broad knowledge which a man gains through successive steps upward on the political ladder.

On the other hand, it is probable that, from the year 1914, only two other Americans were as well known to their fellow-citizens, and there is reason to believe that neither of the others enjoyed greater esteem than was freely given to Hoover, the great humanitarian of the war period. Woodrow Wilson, President of the United States, and John J. Pershing, general of the army of the republic and commander in chief of nearly 2,000,000 American soldiers in France, were officials invested with vast powers. Herbert Hoover, a part of the time without official status, became a world character within a period of a few weeks; before the World War was fairly started, his name was as well known as that of any man clothed with executive or military power. The very success of Hoover in the trying early months of war proved somewhat of a handicap to him later; he accomplished such gigantic tasks, during which no failures to reach his objectives were recorded, that he came to be looked upon as a superman. This popular conception was displeasing to him; he declared that the things he undertook to do were accomplished only by determination to see them through to the end.

[His foreign service is described in more detail earlier in this article.]

Certain issues which were injected into the campaign had never before been sharply drawn in a political contest. When Governor Alfred E. Smith, a Roman Catholic, was nominated for President by the Democratic party, the ages-old issue of religion was precipitated seriously for the first time into American politics.

[John C. Fremont, nominated for President in 1856, was a Catholic layman, but his candidacy was not important, and the religious question was not stressed. At a later day, a Socialist nominee for President was a member of the same Church.]

Another issue was given prominence in the campaign of 1928—that of prohibition. In the Democratic and Republican party plat-

forms were declarations favoring the execution of the prohibition laws—upholding the Eighteenth Amendment to the Constitution and enforcing the Volstead Act. Before the Democratic convention adjourned, Governor Smith sent a telegram to its chairman in which he stated that he would make a public appeal for support in an effort to liberalize the prohibition statute. In a moment, therefore, the aspect of the campaign was changed, and though it was evident that neither candidate, after election, would have the power personally to alter constitutional or statutory conditions, the question was kept to the fore throughout the campaign. Both sides assumed that the nation-wide debate would have value in determining future political policies.

A third great question, stressed vigorously by both parties, was that of relief for the agricultural community, which had failed to recover from the long period of deflation following the World War. The two parties were opposed only as to the methods to be employed to bring a return of prosperity to the farmers.

A notable feature of the campaign was the remarkable use of radio in reaching unknown millions of voters several times each week, through a network of radio stations reaching to every part of the country. The voices of the two Presidential candidates were heard over hook-ups embracing more than sixty broadcasting stations.

In the election, party lines disappeared to a greater degree than ever before. Democrats who were anti-Catholic or were favorable to prohibition deserted their party and supported Hoover; many Republicans who were Catholics or who were sympathetic toward efforts to change the prohibition law became Democrats in the field of national politics, and supported Governor Smith. Up to the time of closing the polls on election day, these two issues made the outcome uncertain in the public mind; their very presence in the campaign was deplored by millions of voters, but they had been presented so vigorously that they could not be ignored.

**Manifold Activities.** When Hoover resigned the position of Secretary of Commerce in June, 1928, following his nomination for the Presidency, he did not retire from other public enterprises with which he had been associated. These indicate the universality of his interests:

President American Child Health Association.  
Chairman American Relief Association Children's Fund.

Chairman of relief committee, Belgian Educational Foundation.

Trustee Carnegie Institution.  
Trustee Stanford University.

Chairman Saint Lawrence Waterway Commission.  
Member of central committee, American Red Cross.

Member advisory board, Hoover War Library and Food Research Institute.

## Outline and Questions on Herbert C. Hoover

### I. Early Life

- (1) Birth and parentage
- (2) Education
- (3) Choice of career as mining engineer

### II. Professional Career

- (1) In English mining enterprise in Australia
- (2) As chief engineer of Chinese Imperial Bureau of Mines
  - (a) Boxer Rebellion
- (3) Member of firm of mining engineers in London
  - (a) Engineering activities in many countries
- (4) Return to San Francisco
  - (a) Sent to England by directors of Panama-Pacific Exposition

### III. War Work

- (1) Assistance to Americans stranded in Europe
- (2) Relief work in Belgium
  - (a) Task involved
  - (b) Honored by King Albert
- (3) United States food administrator
- (4) European post-war relief work

### IV. Public Career in America

- (1) Secretary of Commerce
- (2) Election of 1928
  - (a) Overwhelming electoral vote
  - (b) Campaign Issues
- (3) Manifold Activities
- (4) South American journey
- (5) Inauguration as President

### Questions

What is there exceptional about Hoover's training for the Presidency?

How did he begin his engineering career?

What was Hoover's first experience as a food administrator?

Had there been no World War, what, in all probability, would have been his career?

How did Belgium recognize his services to that country?

What was there remarkable about his management of the Department of Commerce?

Why was Hoover's election so overwhelming in respect to the Electoral College?

What were the main issues in the campaign of 1928?

What was accomplished in the early part of Hoover's administration?

Chairman Better Homes in America.  
Honorary president Izaak Walton League of America.

Other posts which he has held at various times emphasize additionally his worth to his country and to the world:

- President American Institute of Mining Engineers.
- President American Engineering Council.
- Chairman American Relief Administration.
- Chairman Commission for Relief in Belgium.
- United States Food Administrator
- Member War Council.
- Chairman United States Food Administration Grain Corporation.
- Chairman United States Sugar Equalization Board.
- Chairman Allied Food Council.
- Chairman American Relief Administration in Germany, Poland, Russia, Lithuania, Estonia, Finland, Serbia, Czechoslovakia, Armenia, Rumania, Austria, Hungary, Latvia.
- Member Supreme Economic Council.
- Chairman European Food Control.
- Chairman European Coal Council.
- Vice-Chairman Second Labor Conference.
- Chairman European Relief Council.
- Member advisory board, Washington Arms Conference
- Member World War Debt Commission.
- Chairman Colorado River Commission
- President International Radio Conference.
- President National Conference on Street and Highway Safety.
- Chairman National Committee on Wood Utilization.
- Chairman National Radio Conference.

It is said that the burdens entailed through such co-operation in affairs have not rested heavily upon him. He caused facts to be assembled; his decisions were quickly made; he then placed responsibility upon others. He preaches standardization, and at the same time believes in developing individuality.

**South American Journey.** The President-Elect could truly be called a citizen of the world, except for his lack of first-hand acquaintance with South America. In November, two weeks after the election, he began a trip to the various countries of that continent, aboard the battleship *Maryland*. Everywhere he went he was greeted with the Presidential salute of twenty-one guns, as though he were already the official head of the American republic.

The trip was undertaken to draw closer together in friendship and trade the countries of the southern continent and the nation that South Americans have called, not always with kindly meaning, the "Colossus of the North." The western coasts of Central and South America were visited, until the party reached the capital of Chile. Then, by train, Hoover was carried across the Andes Mountains to Argentina, where at Buenos Aires he was met by the battleship *Utah* for the journey up the east coast. It was planned to end the journey

at Havana, Cuba, but he was obliged to return to Washington to assume charge of work preliminary to his inauguration.

**Hoover's Administration.** The inauguration of President Hoover and Vice-President Curtis, on March 4, 1929, was broadcast the country over, by means of an elaborate radio hook-up. The inaugural address of the President evoked widespread interest, for it foreshadowed the policies of the new administration on such vital points as prohibition and farm relief. The President emphasized the need of better law enforcement, not only in respect to prohibition, but in regard to all laws, and urged respect of the law upon all citizens. Early in his administration, he appointed a commission of ten to study the whole question of observance and enforcement, and to investigate the methods of administering justice prevalent in the country. George W. Wickersham of New York was made head of the commission. The enforcement of the prohibition laws was removed from control of the Treasury Department, and placed under that of the Department of Justice. Another commission, composed of army and civilian engineers, was appointed to survey the possibilities of a canal across Nicaragua.

A special session of the Seventy-first Congress convened on April 15, and accomplished the enactment of a farm-relief bill along the lines approved by the President. The bill provided for a board composed of the Secretary of Agriculture, and eight members appointed by the President, at salaries of \$12,000. A revolving fund of \$500,000,000 was put at their disposal, and they were given broad powers to deal with the problems of crop surplus (for further information, see MARKETING ACT, AGRICULTURAL). This session of Congress also enacted a new tariff law providing for substantial increases in the rates on a number of industrial and agricultural products. Another law passed by this Congress provided for a reapportionment of membership in the House of Representatives, and for the 1930 census enumeration.

President Hoover retained two members of the Coolidge administration in his Cabinet—Andrew Mellon, Secretary of the Treasury, and James J. Davis, head of the Department of Labor. Notable among other appointments was that of Secretary of State. This post was offered to Henry L. Stimson, formerly governor of New York, Secretary of War under Roosevelt, and governor-general of the Philippines. The successful completion of the labors of the German reparations commission, headed by Owen D. Young, was gratifying to the President. The new agreement, superseding the Dawes Plan, was reached at about the same time that Charles C. Dawes took up his duties in London, as American ambassador. E.D.F.

**Lou Henry Hoover** (1873- ), daughter of the late Charles D. Henry of California, married Herbert Hoover in Monterey in 1899. From the day when she first met him, in the geological laboratory of Stanford University, she identified herself with his interests, and after their marriage, she accompanied him in all his travels—to China, Borneo, Russia, the Malay Peninsula, England, and South America. In 1910, while they were living in London, she discovered in the British Museum a copy of Agricola's *De Re Metallica*, a rare Latin treatise on metallurgy. For their own amusement, Mr and Mrs. Hoover spent many of their leisure hours translating the ponderous work, and in 1912 published the translation, which brought them both special degrees from Stanford, though little financial recompense.

During her years of girlhood in California, Mrs. Hoover developed an intense love of nature and out-of-door things, and the memory of many happy camping trips inspired in her an interest in the Girl Scout movement. For a time, she was chairman of the board of directors of the organization. A skilled automobile driver, Mrs. Hoover aroused press comment on the fact that she drove her own car in Washington, without any secret-service guards following her.

Mrs. Hoover's long experience as the wife of a man much in public affairs gave her an admirable background for the position of lady of the White House. While she is always a kindly and gracious hostess, she has the poise and dignity requisite for one who must preside at dinners and receptions of an international character.

The Hoovers have two sons—Herbert, Jr., and Allan. The elder is married, and holds a position in Los Angeles as radio specialist for the Western Air Express.

**Related Subjects.** The reader who desires further information on the life of this President is referred in these volumes to the following articles:

|                             |                       |
|-----------------------------|-----------------------|
| Belgium (History)           | Prohibition           |
| Boxer Rebellion             | Quakers               |
| Census                      | Smith, Alfred E.      |
| Coolidge, Calvin            | Stanford University   |
| Curtis, Charles             | Stimson, Henry L.     |
| Dawes, Charles G.           | Tariff                |
| Marketing Act, Agricultural | Wickersham, George W. |
| Mellon, Andrew W.           | Wilson, Woodrow       |
| Mississippi River           | World War             |
| Nicaragua Canal             | Young, Owen D.        |

**HOP CLOVER.** See SHAMROCK.

**HOPE, ANTHONY.** See HAWKINS, ANTHONY HOPE.

**HOPE HALLS.** See VOLUNTEERS OF AMERICA.

**HOP HORNBEAM.** See IRONWOOD.

**HOPI, ho' pe, INDIANS.** See INDIANS, AMERICAN (Most Important Tribes); SNAKE DANCE.

**HOPKINS, JOHNS.** See JOHNS HOPKINS UNIVERSITY.

**HOPKINS, MARK** (1802-1887), the revered president of Williams College for thirty-six years, of whom a former pupil, President Garfield, said, "A log with a student at one end and Mark Hopkins at the other is my ideal college." Hopkins was born at Stockbridge, Mass. After graduation from the

college of which he afterward became president, he studied medicine and practiced the profession for a short time in New York City. In 1830 he became professor of moral philosophy at Williams College, and six years later was chosen its president. In this position he did much to build up the prestige of the institution and to develop the individual student, and won for himself a place as one of the leading educators of his day. In 1857 he became president of the American Board of Foreign Missions, acting in this capacity for nearly thirty years. After resigning as president of Williams in 1872, he remained pastor of the college church.

**HOPKINSON, JOSEPH**, author of *Hail Columbia* (which see).

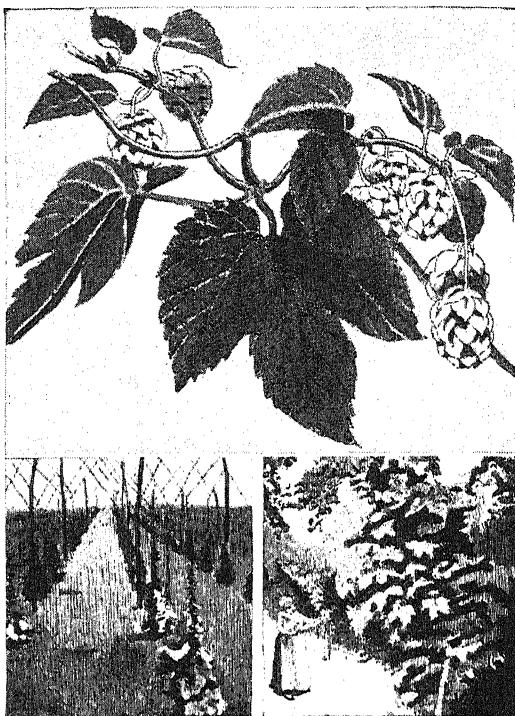
**HOPKINSVILLE**, Ky. See KENTUCKY (back of map).

**HOPPER**, [WILLIAM] DE WOLF (1858- ), an American actor and singer who became famous for his interpretations of comedy rôles, especially in Gilbert and Sullivan light operas. He was born in New York City, and began his career at the age of twenty-one, in *Our Boys*. Hopper was a member of the McCaull Opera Company, known in the eighteen-eighties for its brilliant productions. *Wang*, *Happyland*, and *The Matinee Idol* were among his earlier successes, but it was as Dick Deadeye in *Pinafore*, as Ko-Ko in *The Mikado*, and as the lord chancellor in *Iolanthe* that he gained his greatest fame. In 1918 he starred in *The Better 'Ole*, based on Bairnsfather's cartoons of the World War. After appearing in *Erminie*, during the season of 1921, he headed his own company in a revival of Gilbert and Sullivan, and toured the United States for four years. *The Chocolate Soldier* was included in his repertoire at this time. From 1925 to 1928, Hopper was in *The Student Prince*, and in 1929 he played in *White Lilacs*. He published a book of reminiscences, *Once a Clown Always a Clown*, in 1927. He was married six times.

**HOPS**, as cultivated, are tall, perennial vines that produce a scaly cone fruit widely used in the manufacture of beer. The hop plant, which is closely related to hemp, belongs to the nettle family. The twining stems of the plants, which always twist from left to right, die down to the ground each season, spring up anew in the spring, and in mid-summer bear numerous slender branches, on which the flowers appear. On female plants the flowers are clustered in seed catkins having large, thin scales, or bracts; the resulting cone, when ripe, is the hop of commerce. A yellow resin-like material called *lupulin*, found at the base of the bracts, is the substance that gives hop beer its special flavor.

Hops are propagated by cuttings, six or eight inches long, taken from the large, fleshy roots. Several pieces are planted in each hill,

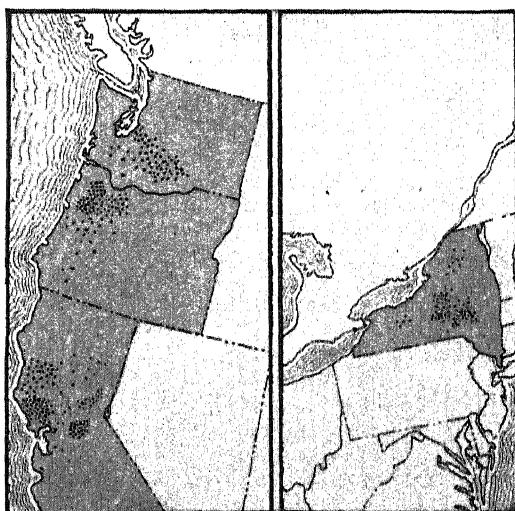
and the hills are usually seven feet apart each way. Hop-growers in New York set in each



HOPS

Above, detail of the hop vine. Below, at left: training young vines on poles. At right: fully-matured vines.

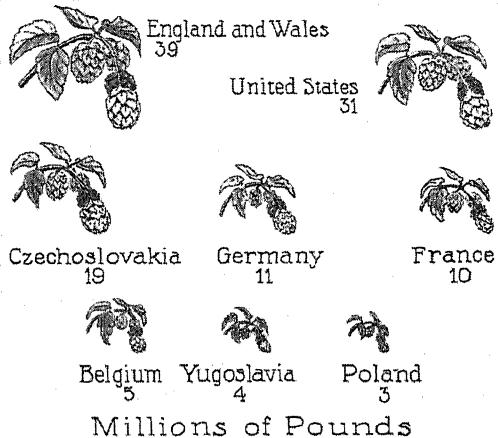
hill a pole fourteen to eighteen feet high, on which the vines are supported. In the hop



PRINCIPAL HOP-GROWING SECTIONS

fields of the Pacific coast, a system of wire trellis is used, and the vines are supported by

strings fastened to the wires. Harvesting is done between the latter part of August and the middle of September. This must be done promptly when the crop is ripe, as hops deteriorate quickly if exposed to the weather too long after maturity. The hops are picked from the vines by hand, dried in kilns, and



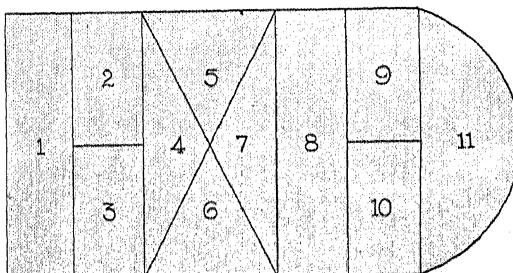
## COUNTRIES LEADING IN PRODUCTION

The figures present averages for a three-year period. Hops are pressed into bales weighing from 180 to 200 pounds.

Hops are grown for commercial purposes in several countries of Europe and in four states of the Union—California, Oregon, Washington, and New York. The yield in America has decreased since the passage of the prohibition amendment. G.M.S.

**Scientific Name.** The botanical name of the hop plant is *Humulus lupulus*. It belongs to the family *Urticaceae*.

**HOPSCOTCH**, a children's game which requires considerable agility and serves to develop poise and muscular control. It is played on a court chalked on the pavement or



HOPSCOTCH COURT

scratched—scotched—on the ground. The court, which is about twenty-five feet long and five or six feet wide, is divided into a number of compartments, as shown in the

illustration. Children often have great fun playing the game on much smaller courts. The aim of the game is to hop through each of the divisions without error. As most commonly played, the player stands at *taw*, a short distance behind the court, and tosses a flat pebble or bit of broken pottery into the first division. Hopping into that division, he picks up the pebble and hops out again. He then tosses the pebble into the second compartment, hops through compartments 1 and 2 (see illustration), picks up the pebble, and hops out again, and so on through each division. When he throws the pebble into 4, he hops into 1, then straddles the line separating 2 and 3, and then hops into 4 and back again. When he hops to 7, he straddles at 5 and 6, and so on. The player who first gets the pebble into 11 and hops through all compartments, without making a mistake, wins the game. It is counted an error to step on a line, to lose one's balance, or to throw the pebble on a line or outside the compartment aimed at. When an error occurs, the contestant retires in favor of the next player.

In another form of the game, the pebble is kicked outside the court instead of being picked up.

**HOQUIAM**, *ho' kwi' am*, WASH. See WASHINGTON (back of map).

**HORACE**, *hor' as* (in Latin, *QUINTUS HORATIUS FLACCUS*) (65-8 B.C.), one of the greatest and the last of the Latin poets, was born at Venusia, in Southern Italy. At an early age he was taken to Rome, where he began his education; later he removed to Athens and took up the study of philosophy. After the assassination of Julius Caesar, in 44 B.C., Brutus visited Athens to secure recruits for his opposition to the powers in Rome. Horace, although without military experience, joined the army, was made a staff officer, and served in the Philippi campaign. On the defeat and suicide of Brutus, Horace returned to Rome, found employment as a clerk, and began to write verse.

Through his friend, the poet Vergil, he met Maecenas, the patron of Roman art and letters, who showed his appreciation of Horace by presenting him with an estate in the Sabine Hills and sufficient income to maintain him. There the poet lived in seclusion and devoted himself to literature. Horace is said to have been not only the first, but practically the only, lyric poet of Rome. His writings are distinguished for their genial satire, and stateliness and dignity of expression. As an important branch of the classics, they are read by college classical students in their Latin courses. The following are examples of his style and thought:

Seize the present moment, trusting as little as possible to the morrow.



Photo: Visual Education Service

## HORATIUS AT THE BRIDGE

Patience renders more tolerable evils to which we can apply no remedy.

Summer friends vanish when the cask is drained to the dregs.

**His Works.** These consist of two books of *Epistles*, the last of which, *The Art of Poetry*, was left unfinished; four books of *Odes*, one book of *Epodes*, or short poems, and a secular hymn written at the request of the Emperor Augustus.

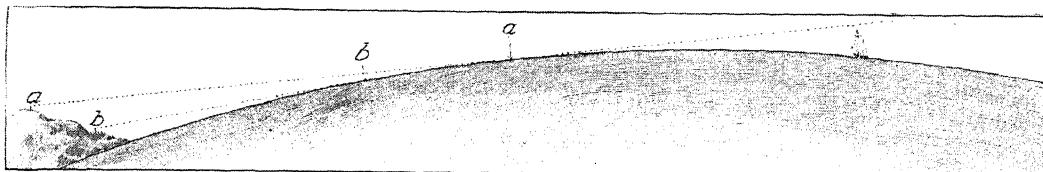
**HORATIUS**, *ho rā' shih us*, a legendary hero whose defense of the bridge across the Tiber River is immortalized in Macaulay's *Lays of Ancient Rome*. The invading Etruscan army, so the story runs, had almost reached Rome before the citizens realized their danger. To destroy the bridge before the arrival of the enemy seemed impossible, but Horatius with two others volunteered to guard its approaches. In the words of Macaulay—

And straight against that great array  
Forth went the dauntless Three,  
For Romans in Rome's quarrel  
Spared neither land nor gold,  
Nor son nor wife, nor limb nor life,  
In the brave days of old.

The ancient custom by which the champions of each army met in single combat, before the clash of the hosts, made it possible for the three Romans to hold back the Etruscans until the citizens, rich and poor together, had chopped the supports of the bridge. Horatius, though heavily armed and wounded, swam the rushing Tiber to safety. The date 508 B.C. is given to Horatius' exploit by those who believe the legend to have an historical basis. Some authorities consider the story to be merely a good piece of imaginative writing.

**HOREB**, another name for Mount Sinai (which see).

**HOREHOUND**, also spelled HOARHOUND, the popular name of several plants of the mint family. The *common*, or *white*, *horehound*, which grows in waste places and by roadsides, is found throughout Europe and Northern Asia and is naturalized in America. The plant is from one to one and one-half feet high and has a whitish appearance, owing to the cottony white hairs with which it is covered. The flowers are small and almost white. The leaves and stems have an aromatic odor and bitter



THE HORIZON  
The details of the illustration are explained in the text.

taste, and from them is made a well-known preparation for the relief of coughs and throat troubles. This may be in the form of a syrup or a candy. The *black*, or *fetid horehound*, an English variety, closely resembles the white species in taste and possesses similar medicinal properties.

B.M.D.

**Scientific Names.** The horehounds are members of the family *Menthaeae* (or *Labiatae*). White horehound is *Marrubium vulgare*; black horehound, *Ballota nigra*.

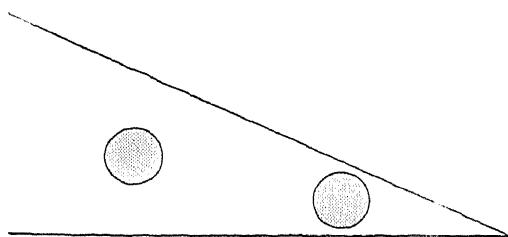
**HORIZON**, *ho ri' zuu*, the imaginary circular line where the earth and sky, or sea and sky, seem to meet. Because of the curvature of the earth's surface, the horizon line appears nearer to the eye when the observer is close to the ground than when he is on a height. For instance, a person on a mountain one mile high can see ninety-six miles, but if he should gaze out over the ocean with his eyes only about four feet higher than the water, his horizon would be only two and one-half miles distant.

In the accompanying diagram, the dotted lines show the lines of vision for an observer standing at *a* and at *b*; *a* on the dotted line shows his horizon when he is at the point *a*, and *b* when he is at the point *b*.

**Distances of Visibility of Objects.** The United States Lighthouse Board gives the distances a person can see objects on the water from various heights, in clear weather. They appear in the table below:

| HEIGHT,<br>FEET | DISTANCE,<br>MILES | HEIGHT,<br>FEET | DISTANCE,<br>MILES |
|-----------------|--------------------|-----------------|--------------------|
| 5               | 2.96               | 110             | 13.87              |
| 10              | 4.18               | 120             | 14.49              |
| 15              | 5.12               | 130             | 15.08              |
| 20              | 5.92               | 140             | 15.65              |
| 25              | 6.61               | 150             | 16.20              |
| 30              | 7.25               | 200             | 18.71              |
| 35              | 7.83               | 250             | 20.92              |
| 40              | 8.37               | 300             | 22.91              |
| 45              | 8.87               | 350             | 24.75              |
| 50              | 9.35               | 400             | 26.46              |
| 55              | 9.81               | 450             | 28.06              |
| 60              | 10.25              | 500             | 29.58              |
| 65              | 10.67              | 550             | 31.02              |
| 70              | 11.07              | 600             | 32.40              |
| 75              | 11.46              | 650             | 33.73              |
| 80              | 11.83              | 700             | 35.00              |
| 85              | 12.20              | 800             | 37.42              |
| 90              | 12.55              | 900             | 39.69              |
| 95              | 12.89              | 1000            | 41.83              |
| 100             | 13.23              |                 |                    |

**Why Does the Moon Look Larger at the Horizon?** The following explanation has been given for this interesting phenomenon by Dr. Ponzo, an Italian psychologist: If two equal circles be drawn in the interior of an angle, the one nearest the apex will always appear the larger, because the sides of the angle are nearer to it. For the same reason, the moon is apparently enlarged at the horizon. That



THE MOON AND THE HORIZON

is, it presents itself on the horizon in the angle formed by the earth and the declining arc of the sky, while in the center of the heavens, it is free in the vast area of the heavens. R.H.W.

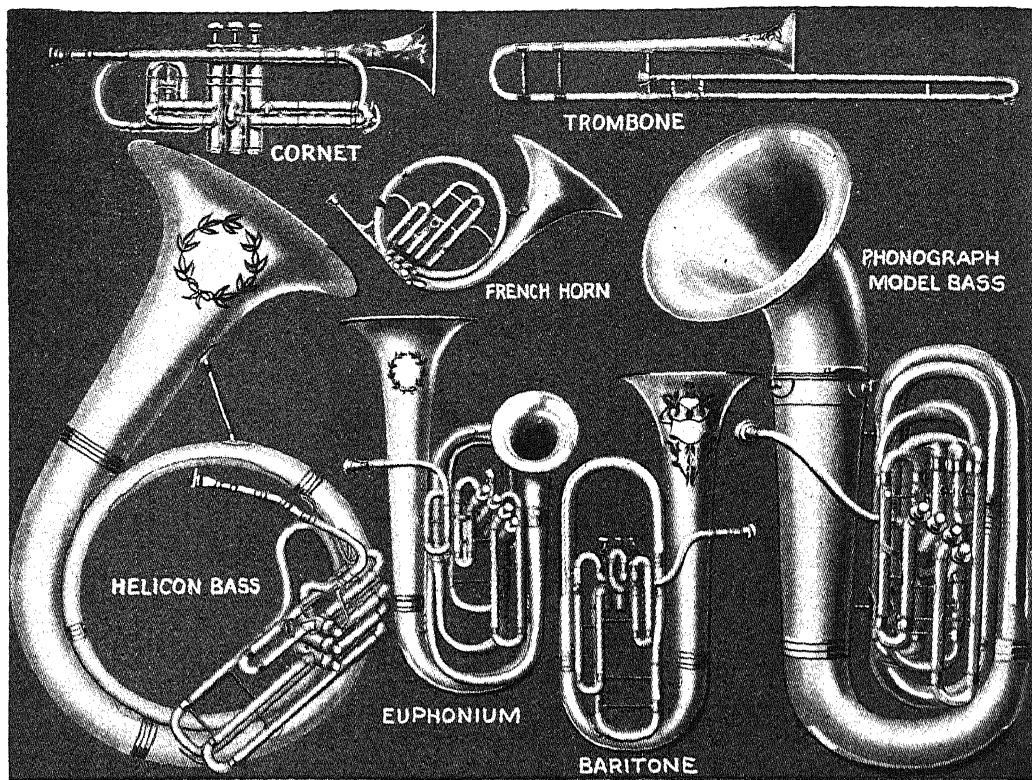
**HORIZON GLASS.** See SEXTANT.

**HORMONES**, *hor mo' neez*. See CHILDHOOD, BEHAVIOR IN; ZOOLOGY (How Zoölogy Affects Human Welfare); GLANDS (Ductless Glands); GOTTER.

**HORN**, a tough, hardened, partly transparent substance, developed from the outer layer of skin, or epidermis, and represented by the *nails* on the toes and fingers of man and other animals, by the *beaks* and *claws* of birds, the *hoofs* of horses and cattle, the *shell* of the tortoise, and the tapering appendages which grow from the head of deer, cattle, sheep, and goats. These latter are known as *horns*.

Whalebone, developed from the palate of certain species of whale, the hard spots on the knees of the camel, the corns on the toes of human beings, the hide of the scaly anteater, and the scales of serpents and lizards are other examples of horn. Chemical analyses of this substance show that it is composed of carbon, hydrogen, nitrogen, oxygen, and sulphur. The purpose of horn is to furnish a protective surface, a tool, or a weapon of defense.

There are interesting points of difference in connection with the horns of various animals. Those of the deer consist at first of bone core covered by flesh and a velvety skin; their horns



SOME OF THE HORMS

are expanded and branched into antlers, which fall off at regular intervals (see DEER). The horns of the giraffe are independent bones with a covering of hairy skin; those of oxen, sheep, and antelopes consist of a bony core covered by a horny sheath, and are outgrowths of the frontal bone. The horns of oxen, sheep, goats, and antelopes are never shed, except in the case of the pronghorn antelope, which is not a true antelope.

**Economic Uses of Horn.** Because of its toughness and pliability, and since it can be softened by heat and molded, horn lends itself to the manufacture of many useful and ornamental articles. It is widely used to make combs; handles for umbrellas, knives, and forks; buttons; drinking cups; and many varieties of boxes. From the solid parts of the buffalo horns, beautiful carvings were formerly made. Horn takes dyes admirably, and through a skilful manipulation of colors, common varieties can be made to resemble costly tortoise shell. The early use of horn for making musical instruments and fog signals has given the name horn to these articles. Powder horns, too, before the advent of cartridges, were spoken of by that name long after they ceased to be made of horn.

**HORN**, a wind instrument which has an important place in the modern orchestra and

band. The orchestral horn in use to-day is an improved form of French horn. It is a brass tube, from nine to eighteen feet long, but twisted back upon itself for convenience in carrying. At one end is a cup-shaped mouthpiece, and at the other, a flaring bell. It has a variable compass of about four octaves. Alteration of notes is effected by pressure on piston valves, which change the lengths of the tubing. Arthur A. Clappé, an authority on musical instruments, says of the French horn:

Of all brass, cupped-mouthpiece instruments, it may justly claim precedence for musical beauty of tone, rich color, dynamic flexibility, and sympathetic vibrancy. Its tonal character is distinctive, being sympathetic, diffusive, and readily blending with those of other instruments, to which it imparts a richness and variety of color not obtainable from any other.

Before the introduction of the valve horn, early in the nineteenth century, the natural horn (without valves) was used. The player of this horn could produce the notes of the scale, and therefore real melody, only by inserting his fingers into the bell-shaped end. The horn of the hunter, which figures so much in song and story, was at first merely a tube bent in a single curve and possessing a mouth-piece. Later, the tube was twisted in circles



Photos: U &amp; U; Wide World

## TWO OF THE HORNBILLS

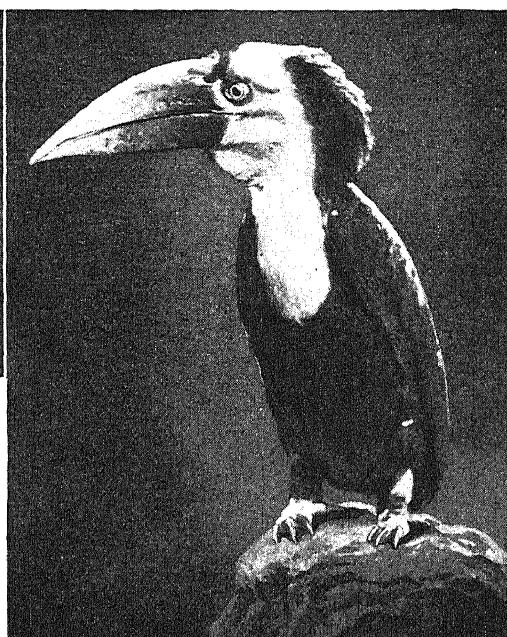
At the left is the species common to Africa. The other, who appears vexed—as though someone had spoiled a perfect day for him—is a native of Sumatra. He eats raw meat, and, some travelers declare, barks like a dog.

so that it could be hung on the shoulder. See ORCHESTRA.

**HORN, CAPE**, in the annals of the sea, possibly the world's most famous cape. The southern extremity of an island of the same name, forming the most southerly point of South America, it is a dark, steep headland, 500 to 600 feet high, running far into the sea. The first man to "round the Horn" was a Dutch sailor named Hoorn; he accomplished the feat in 1616, and his name was given to the headland; in time the name was changed to Horn. The climate is Antarctic, and the region is stormy; "rounding the Horn" was an experience dreaded by mariners for three hundred years. A passage around the Horn conferred distinction on a sailor for having dared the utmost danger that one can be called upon to face on the seas. The Panama Canal now diverts much of the traffic which formerly passed around the southern continent.

**HORNBEAM.** See IRONWOOD.

**HORNBILL**, one of a family of large, ungainly birds, native to Africa and East India. The hornbills have immense horny bills, above which are curious horny growths called *casques*, or helmets. These vary in shape in different species. The bill frequently has sawtooth edges, is very large at the base, much curved, and is pointed at the end. The birds' typical coloring is black and white; the neck is without feathers, and the bill is yellow, often marked with red and black. The hornbills are usually to be found in pairs or groups of six or eight, and they live in the tops of trees except for flights to the ground for berries, fruits, and insects. The larger birds also devour snakes and small mammals. They have a curious habit of tossing the food particles in the air and catching them in the bill as they fall.



The nest is made in a large hollow in a tree, and after the female begins to sit on her eggs, this hole is almost entirely closed in by a mud plaster made by the birds. Through one small opening, the mother bird receives her food during the nesting season from the bill of the male. The male ejects the lining of his gizzard at intervals, possibly to feed the female or young. D.L.

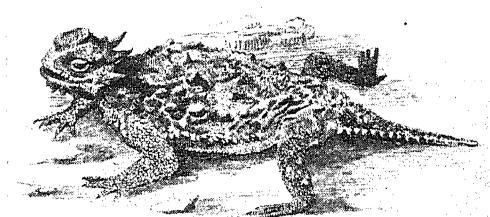
**Scientific Name.** The hornbills constitute the family *Bucerotidae*. The typical species is *Buceros rhinoceros*.

**HORNBLENDE**, a mineral of the *amphibole* group, which occurs in a number of different forms and a great variety of colors. Common hornblende is usually black or dark green. It is frequently found in crystals resembling four-sided prisms. It also occurs in small bladelike forms which cannot be separated as in mica, and can scarcely be cut with a knife. Hornblende is common in diorite and in granite (which see), as well as in schists and gneisses. Some of the most beautiful cabinet specimens are samples of hornblende, since it is not rare in well-developed crystals of varied forms and a variety of colors. When iron is present, these crystals may be of a beautiful green color. In some specimens they are pure white and look like satin; then again they may be of various shades of red. Some asbestos (which see) is closely related to hornblende, as is another peculiar mineral called *mountain leather*. Hornblende is composed chiefly of silica, alumina, magnesia, and lime. A.N.W.

**HORNED LIZARD.** See HORNED TOAD.

**HORNED POUT.** See CATFISH.

**HORNED TOAD**, more properly called HORNED LIZARD, any one of a group of North American lizards that possess a characteristic squat, toadlike body covered with sharp, horny spines. The spines are especially prominent about the head. These lizards are common from Northern New Mexico to California and southward. They are sluggish little creatures, and though harmless, are not without means of defense. Their spiny armor makes them a tough meal for their enemies among the



THE HORNED TOAD

snakes, and they have a peculiar habit of spurting little jets of blood alternately from each eye when disturbed. The horned lizards inhabit sandy places on the plains as well as in the mountains. Their colors resemble those of their surroundings to a marked extent, making them difficult to find. They remain in hiding throughout the day, and come forth at night in search of beetles and other sand-haunting insects, upon which they feed. There are about twenty species. See LIZARD. L.H.

**Classification.** The horned toads belong to the family *Iguanidae* (see IGUANA). The species are grouped into two genera, *Phrynosoma* and *Anota*.

**HORNELL, N. Y.** See NEW YORK (back of map).

**HORNET**, any one of several species of large social wasps that build paper nests consisting of many tiers of cells, all enclosed in a thick paper covering. Wasp paper is made of chewed wood and plant fiber. The large round nests often seen hanging from the branches of trees are the work of the *white-faced hornet*, common in the United States, particularly in the East. Most hornets are dark-colored, with white or yellow markings. They are very nervous insects, especially when working about their nests, and can inflict painful stings when frightened or irritated. Their reputation in this respect has given rise to such descriptive phrases as "stir up a hornets' nest" and "mad as a hornet." For classification and details about their nest-building habits, see the article WASP. See, also, YELLOW JACKET. W.J.S.

**HOROLOGY**, the science of constructing machines and devices for measuring time, such as the clock or watch. It was long after time was divided into years and months and

weeks and days that the day was divided into hours, because no accurate measure had been devised for division of the day. The hourglass was probably the first invention for marking the hours.

**Related Subjects.** The reader is referred in these volumes to the following articles:

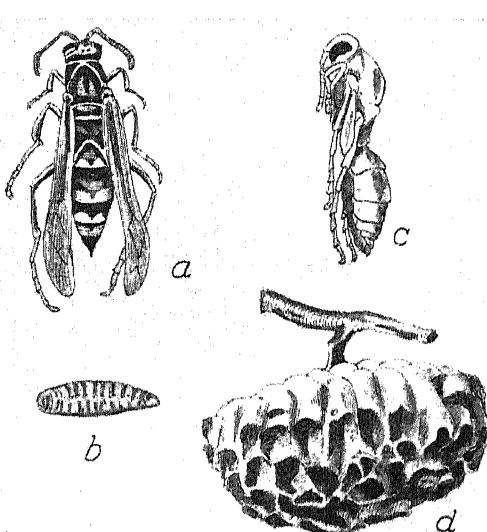
Clock

Hourglass

Watch

**HOROSCOPE**, *hor' o skope*, a word derived from the Greek *horoskopos*, meaning *one who observes the hour*. In astrology it was used to signify the disposition of the stars in the heavens at a certain time. Astrologers "cast a horoscope" by ascertaining what stars were in the ascendant, or rising in the east, at the time of the birth of any particular person. From the position of the stars, they calculated their influence and told the fortunes of inquirers. Such fortune-telling has been proved to be altogether unreliable. See ASTROLOGY; SUPERSTITION (Horoscope).

**HOROWITZ, VLADIMIR** (1904- ), a Russian pianist, acknowledged an outstanding genius of his generation. He has been proclaimed the most successful concert artist to appear before an American audience since the débuts of Jascha Heifetz and Amelita Galli-Curci. Critics are at a loss for superlatives in referring to his technique, which is characterized by great brilliancy as well as clarity.

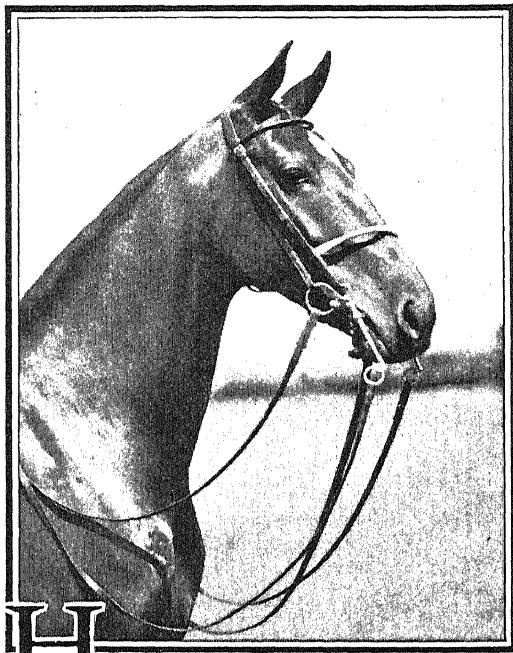


PERTAINING TO THE HORNET

(a) The mature insect; (b) larva; (c) pupa; (d) nest, much reduced in size.

Horowitz was born in Kiev, Russia, and is a member of a prosperous, musically inclined family. He began his piano studies at the age of six, with his mother, an accomplished musician, as his instructor. At the age of seventeen, he was graduated from the Kiev

Conservatory with high honors. The early years of his professional career were spent in giving concerts throughout Russia, and in 1923 he established a record by appearing twenty-three times to sold-out houses in Petrograd (now Leningrad). The following year, he made an extended European trip, visiting Germany, Holland, Italy, France, Spain, Belgium, and England. His first American appearance was in New York City in January, 1928, as soloist with the Philharmonic Orchestra. Forty-five engagements in eighty-one days, including appearances with symphony orchestras in leading cities of the United States, constituted his second appearance, toward the end of 1928. He was received everywhere with greatest enthusiasm.



**H**ORSE. Man knows no more faithful animal than the horse. Centuries of training have developed it from a wild state until to-day it compares favorably in intelligence with the dog, the mule, and some of the apes. Kindness it does not forget; injustice and injury it remembers. Its sense of direction and location is keen, and its power of vision unusual. A horse will often carry its burden safely on the darkest night, if given free rein; it will return to its home if, on the road, control is withdrawn; the milkman's horse, after a few trips, will stop without suggestion from the driver at every house on his route. Will Carleton, the poet, put in rhyme in "*Flash*," *The Fireman's Story*, the tale of the decrepit fire-engine horse that was sold to a milkman; on one morning trip the firebell rang

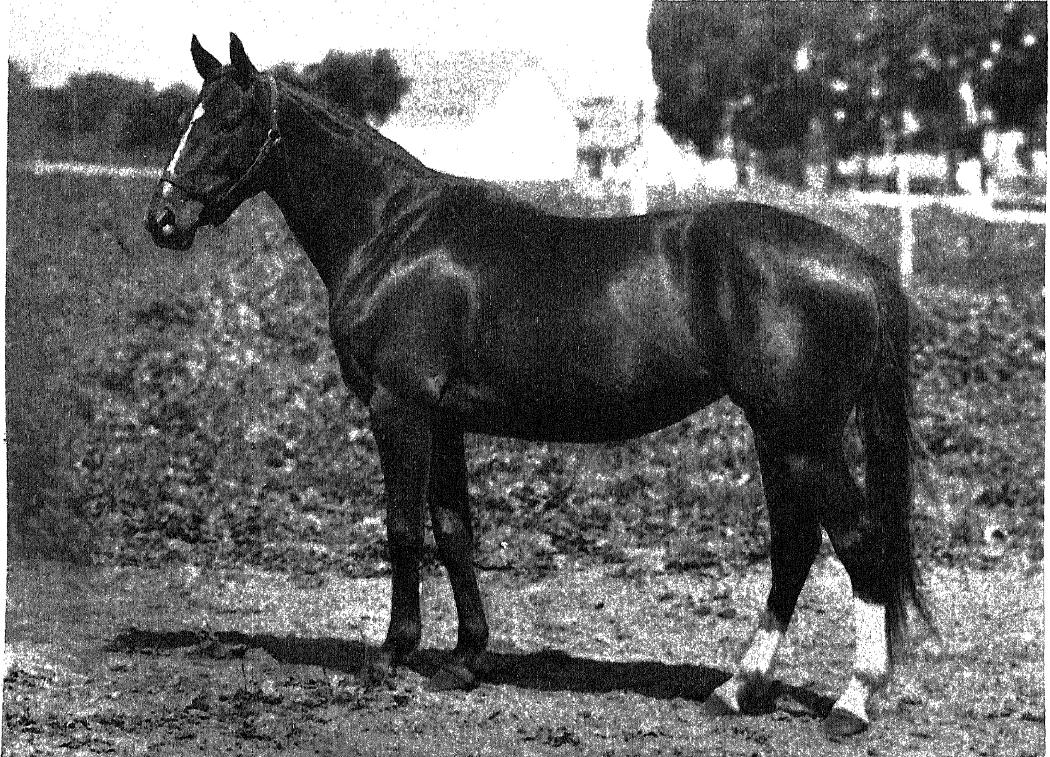
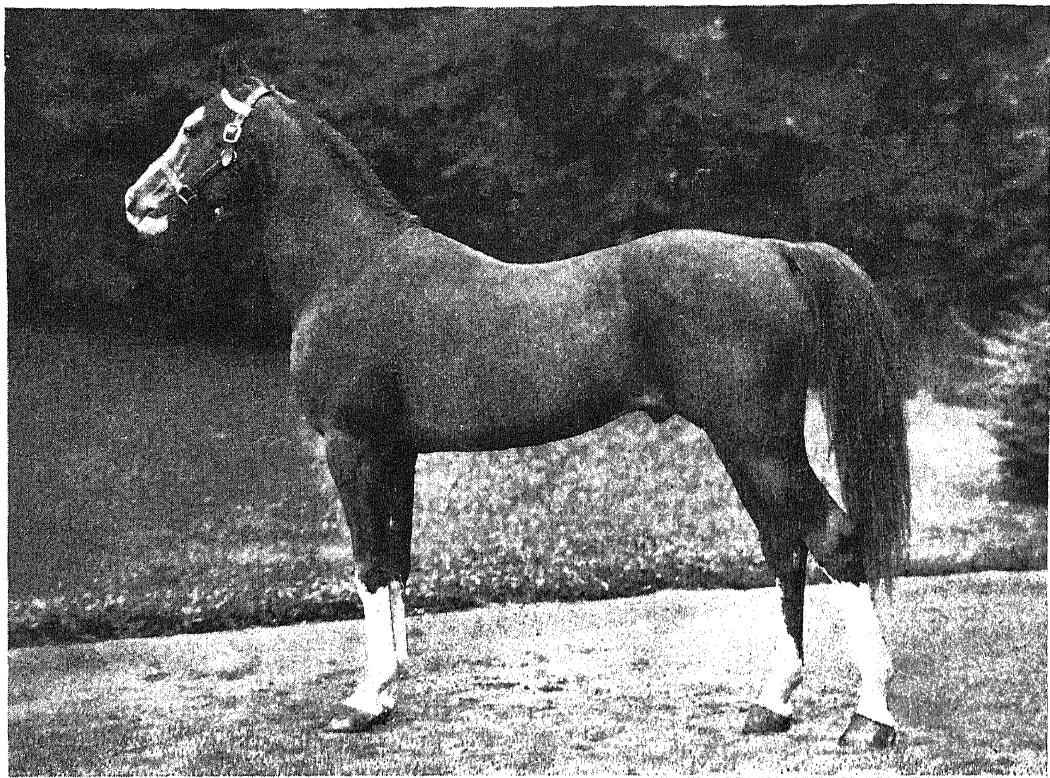
and the habit of years asserted itself. The tale is not overdrawn. A race horse seems to share his rider's enthusiasm and to know that he is expected to distance his rivals. The family horse frequently senses the innocence and defenselessness of children, and will tolerate from them what it might resent from adults.

Much has been said and written concerning the continued usefulness of the horse and the effect of the great increase in automobiles on the numbers of horses and on the business of horse breeding. Reports of the United States Department of Agriculture show a steady decline in number of farm horses since the advent of automobiles into rural life, but there are about 15,000,000 yet on farms throughout the country. On farms of many acres, the tractor is replacing horse power, but the horse is holding its own in many localities where the farmed areas are smaller. There is no question that in cities the automobile has wholly replaced the carriage horse, and that trucks are gradually supplanting the draft horse. It is in the smaller farms and in rural centers that the horse is most successfully resisting the advance of motor power.

While horses have been used mainly for labor, their flesh is allowed to be sold for human consumption in many countries in Europe. The hide lends itself for use as leather for covering baseballs, the manufacture of gloves of the cheaper grades, for shoes, and other uses of the same kind. Horsehide does not stand long-continued wear as well as do calf-hide and cowhide.

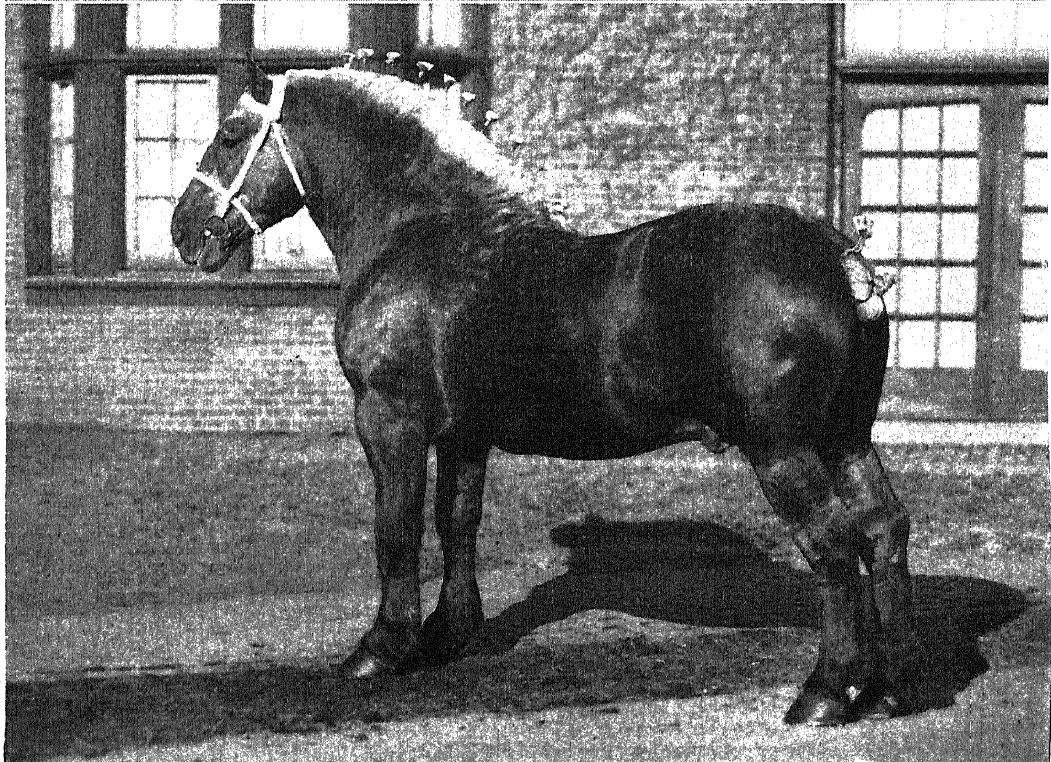
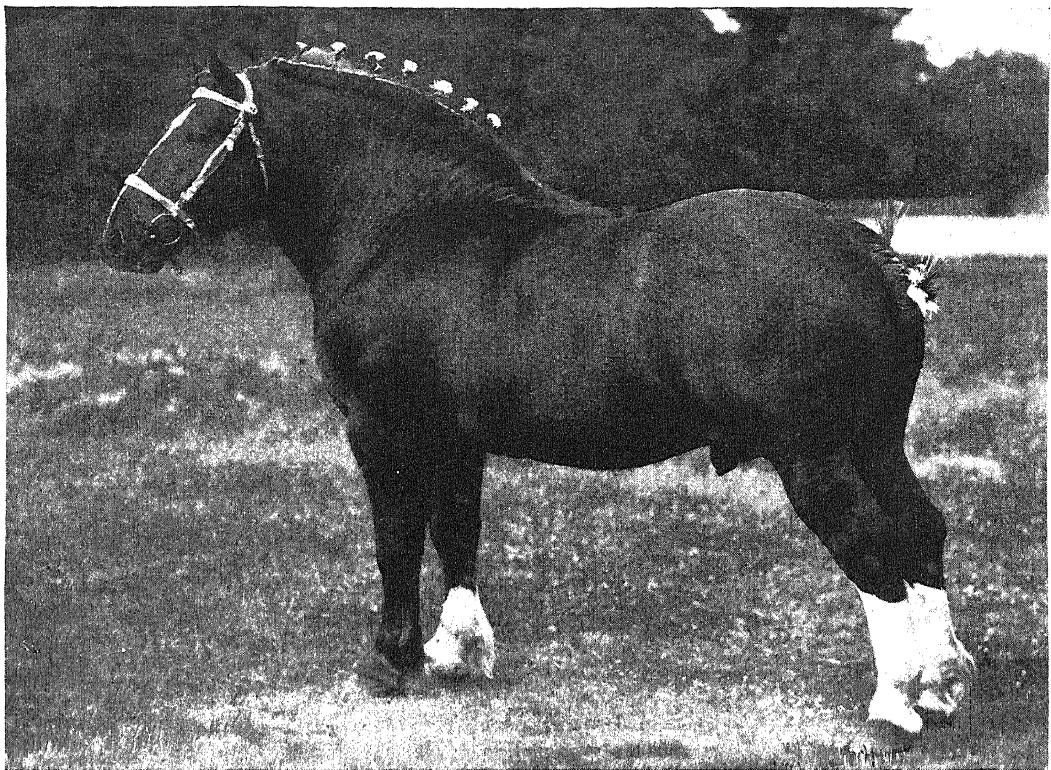
**Length of Life.** The average life of horses is somewhat under twenty years; but instances have been known of horses living over forty years. Probably they can be depended upon for hard work until fifteen years old. Horses attain maturity at five years of age. They may be bred at two years, and may produce their colts at three. The period of gestation is eleven months. Theoretically, a mare should breed and produce a colt each year. In actual practice, the average number of colts produced is usually five or six in the lifetime of the mare.

**Evolution and History of the Horse.** The history of the prehistoric horse is as well known as that of any other domestic animal. A type of animal existed which geological records show was the prehistoric ancestor of the modern horse; it was very small, about the size of a fox, with five toes on each foot. The first form of which there is any definite knowledge occurred in the early part of the age of mammals. It had four toes on the forefoot and three toes on the hind foot, and from this form the horse has gradually increased in size and lost all except one toe on each foot; accompanying this increase in size, the middle toe became big and hooflike and the side toes



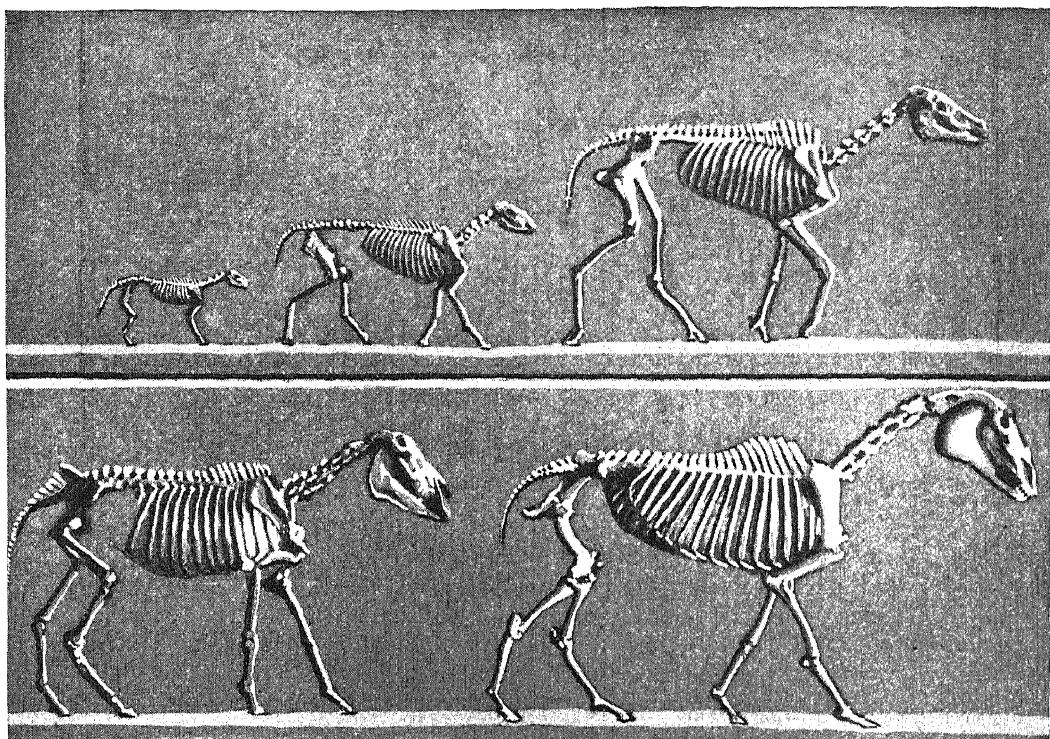
Photos: Live Stock Photo Co.

Two Fine Specimens. Above, an Arabian type. Below, a thoroughbred from Kentucky.



Photos: Live Stock Photo Co.

**Grand Champions.** At top, Waynedale King, Belgian stallion. Below, Don Degas, Percheron stallion.



EVOLUTION OF THE HORSE  
Explanation of the drawing appears in the text.

became only short bones along the leg. The present form of zebra, the wild ass of Asia, and Przewalski's horse, a wild pony found in Asia in 1881, are thought to be the connecting links between the prehistoric horse and the horse of modern times.

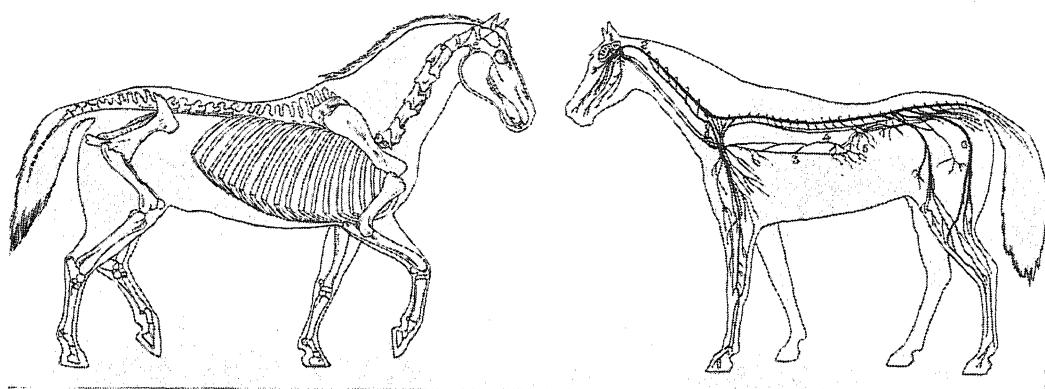
The prehistoric horse is known to have existed in all parts of the world except Australia. The modern type was not found in America by early settlers, but it existed all over Europe and Asia. Improvements in the modern horse and its evolution into the types now known and used for domestic purposes have taken place in the last six centuries. Previous to this time, the Arabian horse, which has had great influence in the improvement of the modern types of both light and heavy horses, existed. According to tradition, Arabian horses can be traced to 1634 B.C. They have been imported into all countries in which the modern horse has reached its greatest development.

The Spaniards brought the horse to America; previous to their coming, the animals were unknown to the Indians. Where there are wild horses to-day in the United States, as on the Hatteras Banks of North Carolina, and on the Western plains, they are descendants of the early Spanish horses of Mexico, which escaped and multiplied. The first users of the lariat

in America were the Spaniards, and they taught the plainsmen how to swing it. The Spaniards themselves had learned its use from the Moslems of Asia, after the latter had settled in Spain.

**Principal Types.** The three main types of the modern horse are the *roadster*, the *coach*, and the *draft* types. These types are represented by distinct breeds, each of which has a more or less complete history. In addition to these main types may be mentioned the *thoroughbred* type, which has attained the greatest prominence in England in racing, the *American saddle horse*, and several breeds of *ponies*.

The *roadster*, or light-harness type of horse, is best represented by the American standard-bred, which may be either trotter or pacer. It is descended from the thoroughbred, which in turn traces back to an Arabian foundation. These horses are characterized by prominence of muscles and joints, leanness of body, and a general angularity of appearance not found in the coach or draft types. Quality, which is shown by refinement in the head and limbs and prominence in veins and muscles, is essential in the roadster. The action of this type must be strong and true; it must be long, with the feet picked up with a snap and carried forward in a straight line. The feet are not raised high, and consequently there is less



SKELETON AND NERVOUS SYSTEM OF THE HORSE

At left, its skeleton. At right, its nervous system, with references as follows: (1) Brain; (2) spinal cord; (3) pneumogastric; (4) sympathetic system; (5) solar plexus; (6) sciatic.

knee and hock action than in the coach type. Standard-bred horses have reached their best development in America. Horses of this type vary in weight, since this is not necessarily a factor in their usefulness. They range in weight from 1,000 to 1,400 pounds.

A light horse has been known to travel under saddle seventy miles in twenty-four hours, but it is not usual to drive more than thirty to forty miles per day. It is considered very good work when a cavalry troop covers thirty miles.

The *coach*, or *heavy-harness*, horse, has been developed for the handling of heavier vehicles at a slower speed than is expected of the lighter driving type. The coach horse must be more showy in action, and consequently his gait has more knee and hock action and less speed. The body conformation is rounder, less angular, and more stylish than the driving type. The coach type is represented by the hackney, the French coach, the German coach, and the Cleveland Bay breeds of horses.

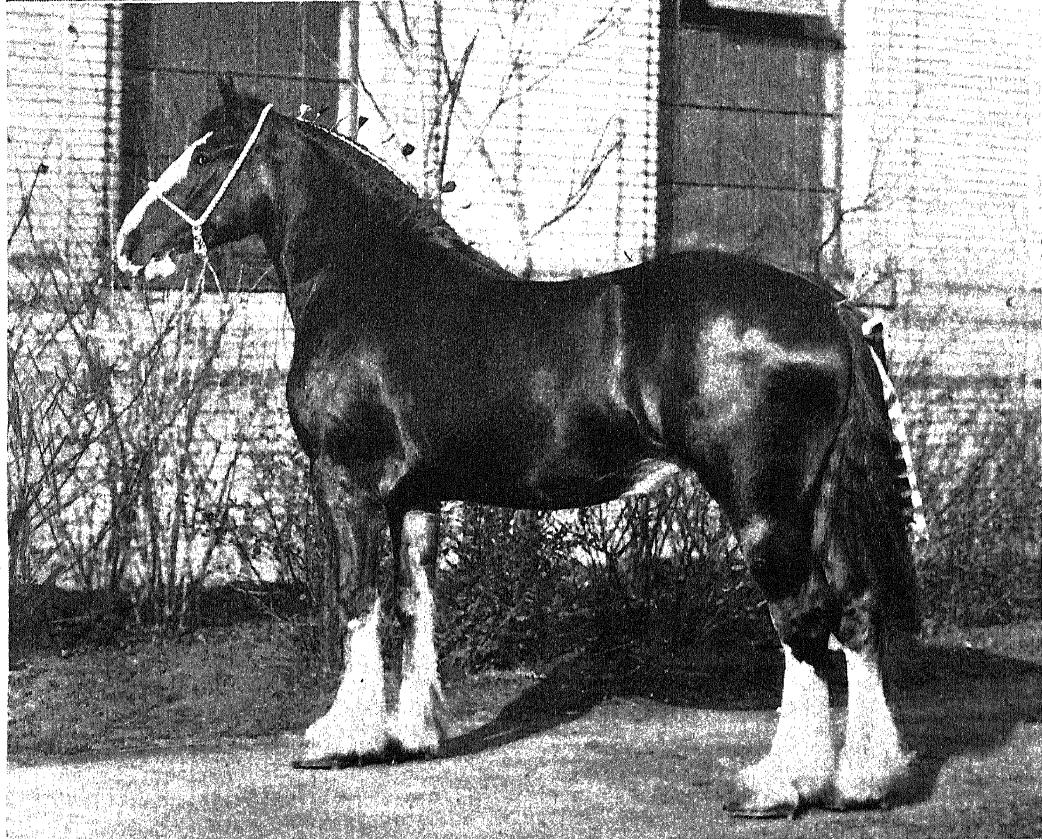
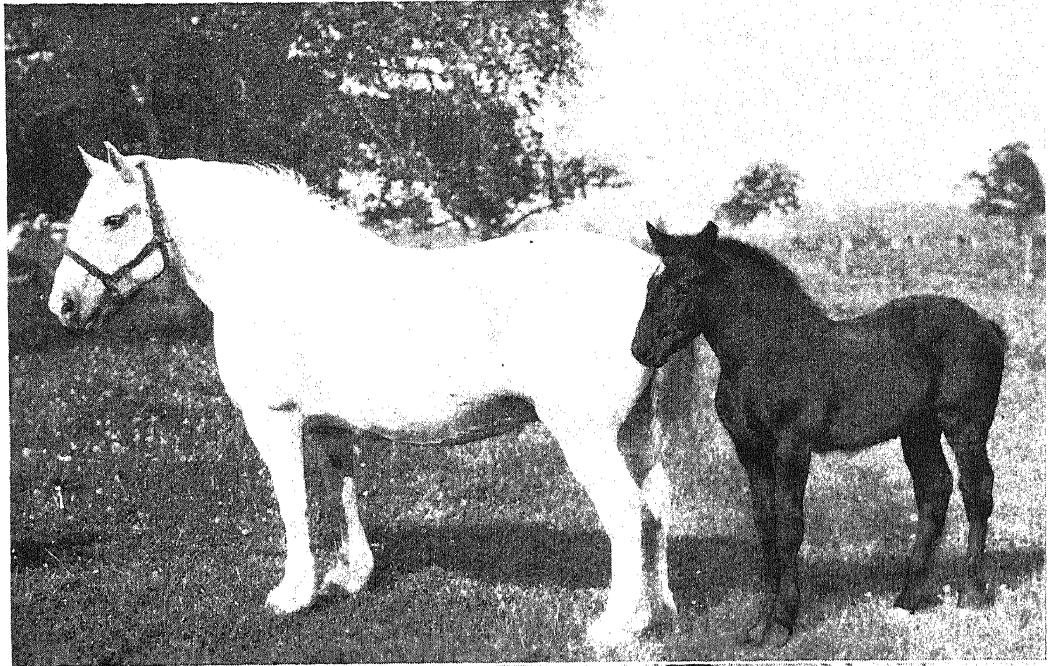
In the *draft* type, the necessary qualification is weight, but style, action, and good appearance have not been sacrificed in the production of draft horses carrying much weight. Light draft horses should weigh from 1,500 to 1,600 pounds, medium from 1,600 to 1,700, and the heavy from 1,700 pounds upward. Coarseness of bone and angular, rough joints are very undesirable in a draft horse. A horse is no better than his feet. Coarse bones and rough joints are often associated with poor feet and a coarse head and neck. The breeds representing this type of horse are the Percherons of France, the Clydesdale of Scotland, the Shire of England, the Belgian of Belgium, and the Suffolk Punch of England. All these breeds have attained prominence in North America and those other parts of the world needing a heavy horse type for draft purposes.

**Care and Feeding of Horses.** Horses respond to careful, intelligent care and treatment. There is a saying that a good grooming is worth a quart of oats any day. The horse should be kept in a well-bedded stall, in a clean, light, well-ventilated stable. If he can be blanketed, he will have a better-appearing coat; a light blanket in summer will keep off the flies and add to his comfort.

The rations of horses are limited in all countries, practically, to the hays and the cereal grains. The kind of food varies with the locality. In the Eastern United States, timothy hay and oats make up the favorite ration; farther west, corn enters into the ration, with clover and alfalfa hay; on the Pacific slope, rolled barley is used with hay from the wild oat and barley plants; in the South, corn is the chief grain feed, with the leaves of the corn plant for roughage. In other countries, rye and other cereals find favor. As an example, the following ration may be suggested for a draft horse weighing 1,500 pounds: sixteen pounds of mixed hay, timothy, and clover, and sixteen pounds of mixed corn and oats ground together, half and half by weight. If the horse is at light work, the grain would be cut down and the hay increased.

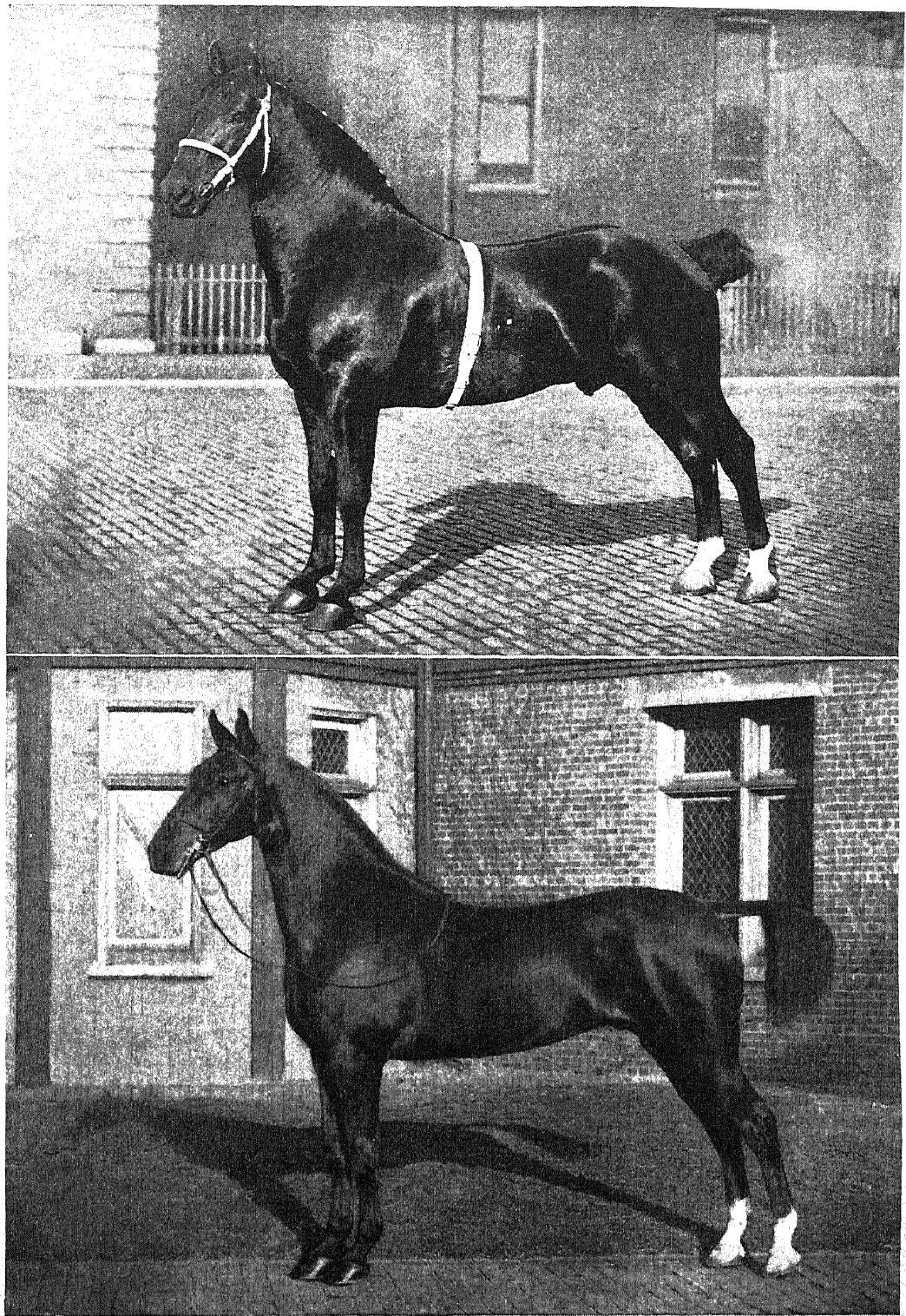
For driving horses, timothy hay and oats are the favorite ration. The by-products in the milling processes that have found much favor in the feeding of sheep, dairy cattle, and beef cattle have not been in favor with horsemen, with perhaps one exception—oil meal, the residue from flaxseed in the manufacture of linseed oil. This meal, fed at the rate of one pound a day, helps to keep the animal's coat smooth and the body in good working condition.

The stomach of the horse is small, and will hold about nineteen quarts. Theoretically, to get the best digestion of grain, the horse should be fed some hay first, then his grain, and lastly



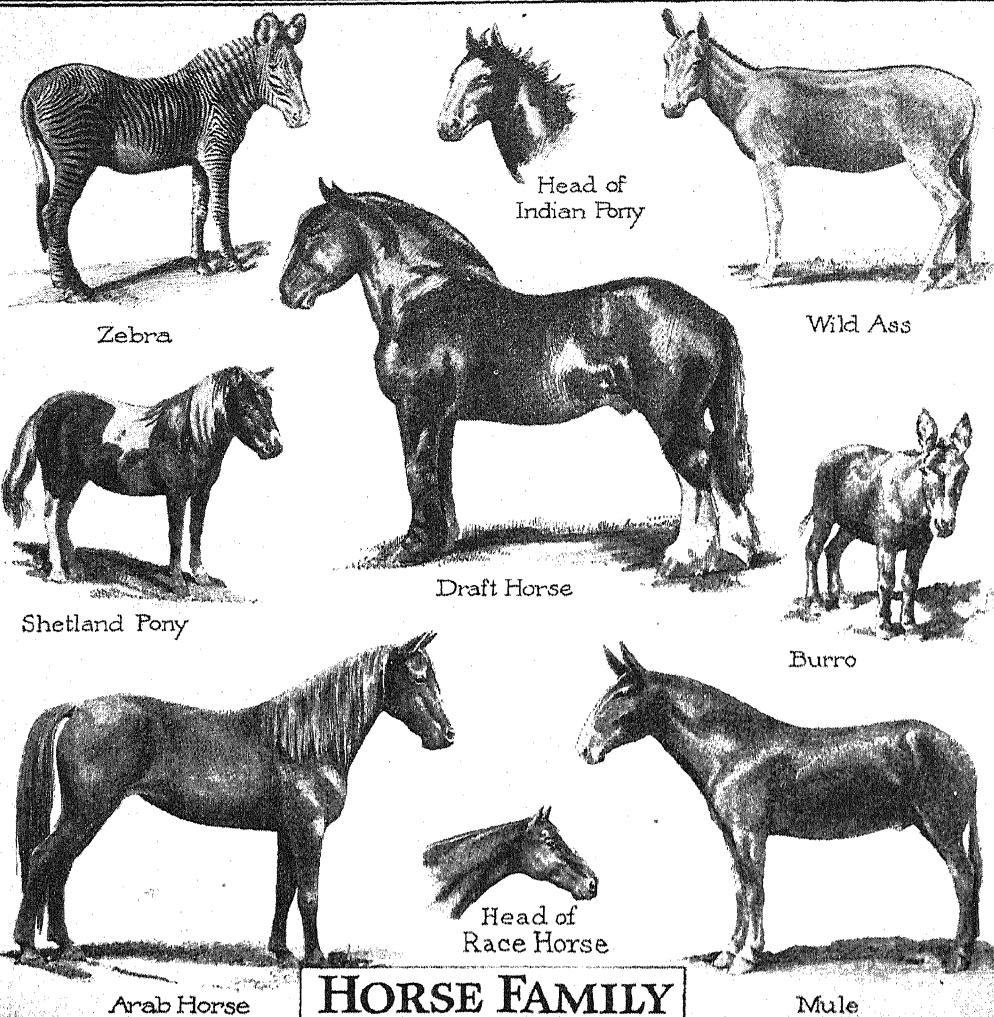
Photos: Live Stock Photo Co.

**Two Winners.** A fine specimen of Percheron mare, with colt, in the first picture. Below, a grand champion Clydesdale mare.



Photos: Live Stock Photo Co.

**Finely Trained.** Above, hackney, or coach, horse. Below, a saddle horse. 3249



## HORSE FAMILY

more hay. This may not suit him, in that he will perhaps refuse to eat any hay and be impatient for his more palatable grain; to overcome the bad effects of this, it is good practice to feed some moistened, chopped hay with the grain. A good system in feeding is to feed one-fourth of the grain ration in the morning with some hay, one-fourth at noon with what hay he has time to eat, and one-half the grain ration with the rest of his hay at night. This plan gives the horse the most of his food when he has time to eat and digest it.

Much has been said and written concerning the watering of horses. It seems to be the best practice to water the horse, then feed him, and then allow him to drink again after eating. Theoretically, he should receive no water after eating, but in practice it seems

best to give him some water then. A horse may be watered when warm if due care is taken; the best practice is to let him have a swallow of water, then pull his head out of the trough, let him have another swallow, and pull his head out again. Continue this practice until the most of his thirst has been quenched. The danger in watering a horse when he is hot comes not from the water, but because a large quantity of water striking his stomach at one time chills it or partially paralyzes it, resulting in acute trouble. A horse should have a chance to drink every five hours, or more often if convenient.

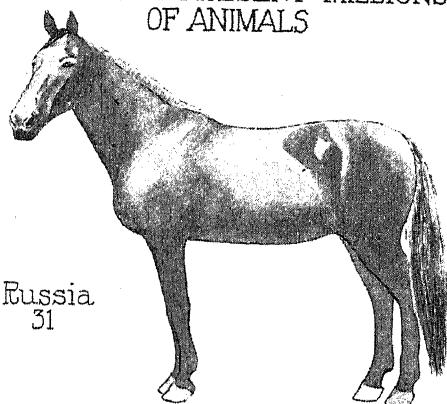
The efficiency of a horse will, of course, depend on the length of his working day. Every owner of work horses should so plan his work that his teams do not stand idle at any season of the year.

W.N.H.

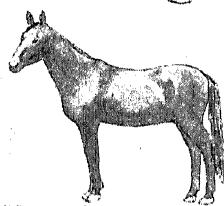
**Horsehair Industry.** Hair from the mane and tail of the horse has large commercial use, and is derived chiefly from animals of South America, the United States, and Great Britain. Long hair is much in demand for haircloth, for fishlines, and for all varieties of fine brushes. The softer short hair is curled and used for stuffing upholstered furniture. The process includes cleaning, sorting, dyeing, braiding, and sterilizing, and finally carding by machinery or hand.

**Classification.** Horses belong to the family *Equidae* and the genus *Equus*. To this genus and

### FIGURES REPRESENT MILLIONS OF ANIMALS



Russia  
31



United States  
15



Brazil  
3



Germany  
4



Canada  
3



France  
3



Argentina  
9



China  
5



Poland  
4



Australia  
2

### COUNTRIES OWNING THE MOST HORSES

Figures present averages over a period of five years.

family belong also the *ass*, *mule*, and *zebra*, each of which is described elsewhere in these volumes. The scientific name of the horse is *Equus caballus*.

**Diseases of Horses.** Under their headings, in these volumes, the following diseases of horses are treated:

Distemper  
Glanders

Heaves  
Spavin

**HORSE, THE WOODEN.** See TROY (The Trojan War, subhead).

**HORSE BRIER.** See GREEN BRIER.

**HORSE-CHESTNUT**, the common name of a genus of nut-bearing trees which, however,

have no botanical kinship with the true chestnuts. The species native to America are called *buckeyes*, from a light-brown scar on the seed, or nut, which somewhat resembles the partly opened eye of a buck, or deer. The

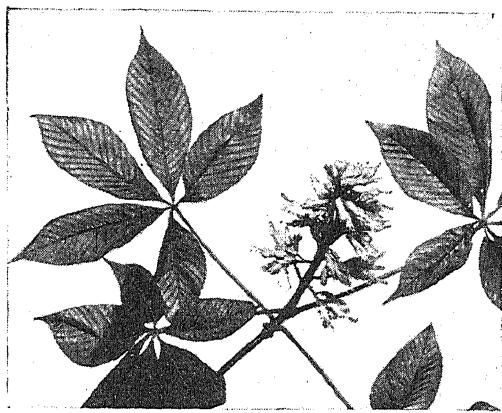


Photo: Visual Education Service

### OHIO BUCKEYE

European species are always called *horse-chestnuts*. This name may come from the size of the nuts, or from their former use as food for horses, or from the resemblance of the seed scar to a horse's hoof. In general, the trees of this genus have large compound leaves, rather showy white, greenish-white, or yellow flowers, and large nuts enclosed in spiny husks. Buckeyes usually have leaves with five leaflets, while horse-chestnuts have seven-fingered leaves. The latter are the sturdier plants.

In the Mississippi Valley is found the *Ohio buckeye*, the tree that gave the name "Buckeye" to the state of Ohio. Because the nuts are believed to poison stock, the tree has been cut down to a considerable extent, and there are now few Ohio buckeyes in the state. This tree is also called *fetid buckeye* because of its disagreeable odor. Some species of buckeye have smooth-husked nuts, and the fruit of the California species was used as food by the Indians.

In Europe the *common horse-chestnut* is esteemed as a street and park tree on account of its wealth of dark-green leaves and handsome some white flowers. It is also planted in America. Its nuts are a nutritious food for stock, and starch is extracted from them in France. The wood of the horse-chestnuts and buckeyes is strong and light, and is especially suitable for artificial limbs. It is also used for woodenware and to make pulp for paper. G.M.S.

**Scientific Names.** The genus belongs to the family *Hippocastanaceae*. Its botanical name is *Aesculus*. The Ohio buckeye is *A. glabra*; the common horse-chestnut, *A. hippocastanum*.

**HORSE FLY**, also called **GADFLY**, an active, strong-flying black fly which, because it is a

great water-drinker, is generally found near inland ponds and streams in all parts of the United States and Canada during the summer. Horse flies attack both men and animals, particularly horses and cattle, and are extremely troublesome along country roads and in pine woods, although their bite is not as painful as that of a mosquito, as no poison is injected. Nevertheless, they attack sick animals, and are believed to carry infectious diseases from animals to men. Kerosene, fish oil, or pine tar, sprayed on horses and cattle, will repel the insects. The young of these flies are whitish maggots having a body tapering at both ends. They live in water or muddy soil and feed on snails, insect larvae, and other forms of animal life.

W.J.S.

**Classification.** The horse flies form the family *Tabanidae* in the order *Diptera* (which see). About 200 species are known in North America.

**HORSEFOOT.** See HORSESHOE CRAB.

**HORSEHAIR INDUSTRY.** See HORSE, subhead; HAIRCLOTH.

**HORSEHAIR WORM.** See THREADWORM.

**HORSEHEAL.** See ELECAMPANE.

**HORSE LATITUDES**, the name formerly given by mariners to a belt in the Atlantic Ocean, near the Tropic of Cancer, notorious for its tedious calms. The name is said to have originated in colonial times, when vessels freighted with horses, from New England to the West Indies, were often so long detained under the scorching rays of the sun in this belt of calms that many of the animals perished because of lack of water. The term, however, is given generally to belts of very light rainfall extending around the earth in latitudes 25° to 30° north and south. See DOLDRUMS.

R.H.W.

**HORSE MACKEREL.** See TUNNY.

**HORSEMANSHIP**, the art of riding or managing horses. It is not known which people first tamed horses and attempted to ride on their backs, but it is certain that they rode bareback, and used some form of a bit, either rawhide or bronze, to guide and control the direction and speed of the animal. Records of the early games and pageants show that skill in horsemanship was a coveted accomplishment, while horse racing and feats of endurance on horseback were very popular.

Various styles in riding have developed. The English rider prefers the stirrup straps shortened, allowing the legs to be slightly flexed, so that the horseman may more easily rise in the saddle, and avoid jolts when the horse trots. This position is a severe tax on the leg muscles, besides being tiring to the horse. The method which the Indians taught the American cowboys, required that the stirrups be longer and carry the legs in a more vertical position. The horse is mounted from

the animal's left side, and a comfortable sitting position is taken, securing the seat by knee grip and balance. The horse trained for riding is controlled by the rein and pressure of the heel in the flank. The reins are held in the left hand, and once the rider and horse have become acquainted with the habits of the other, management of the horse is greatly simplified. A slight jerk on the mane is sufficient to start the horse on a trot, during which time the reins are held a little tighter, to guide the horse and keep him under control. If the rider desires a walking gait, he gives his mount free rein, and signals by a light touch on the flank. Few horses if properly treated are vicious or hard to handle.

**HORSEMINT.** See BALM.

**HORSE NETTLE.** See SOLANUM.

**HORSE POWER** is the unit in which the power of an engine is measured. After many experiments to find the loads that strong draft horses could pull, James Watt determined this unit to be the power required to lift a weight of 33,000 pounds one foot in one minute. If an engine moves the same load one foot in one-half or one-quarter the time, it is twice or four times as powerful, and has therefore two or four horse power. That is, the power is proportional to the time used to pull the load.

If a man weighing 175 pounds climbs seven flights of stairs to a height of seventy-five feet, he will do 13,125 foot-pounds of work. If he does it in one minute, he will exert  $\frac{13,125}{33,000}$  or .39, horse power. If the climb requires five minutes, the power will be one-fifth as much, or .078 horse power. In expressing electrical power, it is customary to use the kilowatt. One horse power equals 746 watts; a kilowatt is 1,000 watts (see WATT).

**How the Horse Power of an Engine Is Determined.** Since the development of the gasoline engine, considerable confusion has arisen because of various means of determining power, and it is not uncommon to see an automobile advertised as 20 horse power according to one method of rating, and 40 horse power according to another. Three methods are explained here:

**"Indicated" Horse Power.** Steam engines have long been ranked in power according to the work done upon their pistons by the steam. If the average force exerted upon the piston of a cylinder is multiplied by the length of its stroke in feet and by the number of strokes per minute, the result divided by 33,000 will give the horse power of the cylinder. An indicator on the engine tells the pressure of the steam upon a square inch of the piston, and this, multiplied by the area of the piston in square inches, produces the force exerted. For a gasoline engine, exactly the same method

may be used, except that there is no indicator; the pressure varies greatly as the piston moves forward toward the exhaust, and the average pressure must be estimated. The latter varies from 45 pounds to 125 pounds to the square inch. For an ordinary engine, 60 pounds is considered a conservative figure; for a sleeve-valve engine, 85 pounds. In a four-cycle engine, the number of strokes is found by dividing the number of revolutions of the crank shaft per minute by two, since there are two revolutions to every cylinder explosion.

*S. A. E. Rating.* This is the method approved by the Society of Automotive Engineers, formerly known as A. L. A. M. (Association of Licensed Automobile Manufacturers). It is based on indicated horse power, but assumes that, in every engine, a piston travels 1,000 feet in a minute, and that the pressure on it is about 70 pounds per square inch. It therefore takes into consideration only the area of the piston, and determines the horse power by multiplying the square of the diameter (*bore*) of the cylinder by the number of cylinders, and dividing the result by 2.5. Most automobile engines are now built with a longer stroke and to run at much higher piston speeds than when this method was adopted, and they are very much underrated by it. As a result it is the method generally employed when engines are taxed according to their power, for the amount of the tax is less.

*Brake Horse Power.* This is sometimes called the *effective* horse power. Instead of being the force exerted at the cylinders, it is that which the engine is capable of applying to its work. For steam engines, it is from eighty per cent to eighty-five per cent of the indicated horse power. It is determined by tests with a dynamometer. It should not be confused with power exerted by the brakes of an automobile. Obviously, this method of rating engines is the most satisfactory, and it is now quite generally employed.

*Comparison of the Three Methods.* A certain automobile engine of standard type has four cylinders, each with a bore of 3.5 inches and a stroke of 5 inches. Its crank shaft makes 2,500 revolutions per minute. The process of discovering indicated horse power may be expressed in an algebraic formula, as follows:

$$H. p. = m. e. p. \times \frac{\pi B^2}{4} \times S \times \frac{r. p. m.}{2} \times C \times \frac{1}{33,000}$$

in which the letters stand for *mean effective pressure* per square inch, diameter of *bore* in inches, length of *stroke* in feet, *revolutions per minute*, and number of *cylinders*. Assuming 60 pounds to be the pressure, the horse power of this engine will be

$$60 \times \frac{3.1416 \times 3.5 \times 3.5}{4} \times \frac{5}{12} \times \frac{2500}{2} \times 4 \times \frac{1}{33,000} = 36.4, \text{ indicated horsepower.}$$

According to S. A. E. rating, the engine will develop

$$\frac{B^2 C}{2.5} (\text{often written } \frac{D^2 N}{2.5}) = \frac{3.5 \times 3.5 \times 4}{2.5} = 19.6.$$

The brake horse power actually developed by this engine is 39.5, which shows that in this instance more than 60 pounds per square inch is the pressure on the pistons. See STEAM; AUTOMOBILE. A.L.F.

*Problems.* 1. An engine is required to pump 8,000 gallons of water per hour into a reservoir 40 feet above the source of supply. How much horse power is needed?

#### SOLUTION

$$H. P. = \frac{\text{foot-pounds per minute}}{33,000}, 1 \text{ foot-pound}$$

being the amount of work done in order to raise a weight of one pound through a distance of 1 foot.

8.34 pounds = weight of 1 gallon of water.  
8,000  $\times$  8.34 pounds = 66,720 pounds, weight of 8,000 gallons.

$66,720 \times 40 = 2,668,800$ , number of foot-pounds, or work done in lifting 8,000 gallons 40 feet in one hour.

$\frac{2,668,800}{60} = 44,480$ , number of foot-pounds per minute. Then  $H. P. = \frac{44,480}{33,000}$ , or 1.35, approximately.

2. What is the horse power of an elevator motor which raises a load of 1,500 pounds from the bottom to the top of a 100-foot shaft in 10 seconds?

$$H. P. = \frac{\text{foot-pounds per minute or}}{\text{foot-pounds per second}}$$

$100 \times 1,500 = 150,000$ , number of foot-pounds, or work done in lifting the load 100 feet in 10 seconds.

$\frac{150,000}{10} = 15,000$ , number of foot-pounds per second.

ond. Then  $H. P. = \frac{15,000}{550} = 27.27$ , approximately.

3. In what time would a man lift a 60-pound bucket of water up a well 30 feet deep, in order to be working at the rate of 0.5 horse power?

$60 \times 30 = 1,800$ , number of foot-pounds of work accomplished.

Since  $H. P. = \frac{\text{foot-pounds per minute}}{33,000}$ , a person

exerting 0.5 horse power for 1 minute would accomplish  $0.5 \times 33,000$  foot-pounds of work, or 16,500 foot-pounds.

At this rate it would take  $\frac{1,800}{16,500}$  or  $\frac{6}{55}$  minute, or about 6.5 seconds, to accomplish 1,800 foot-pounds of work; that is, to raise a 60-pound bucket 30 feet.

**HORSE RACING.** See RACE (Speed Records by Horses).



Photo: U &amp; U

## DIGGING HORSE-RADISH

The scene is in the Spreewald, Germany, where more of these plants are grown than in any other part of the world.

**HORSE-RADISH**, an herb belonging to the same family as water-cress and mustard, is cultivated for its long, cylindrical roots. These are extremely pungent in flavor, and when grated and mixed with vinegar, are served as a relish with cold meats, oysters, etc. They are also used medicinally as a stimulant and to promote digestion, though physicians do not advise their use in this way. As almost any small portion of the root will grow if left in the ground, the plant is very difficult to uproot when once it has become established. On the other hand, it is easily propagated for home use. Horse-radish is native to Europe and Asia, but has become naturalized in most parts of the world.

B.M.D.

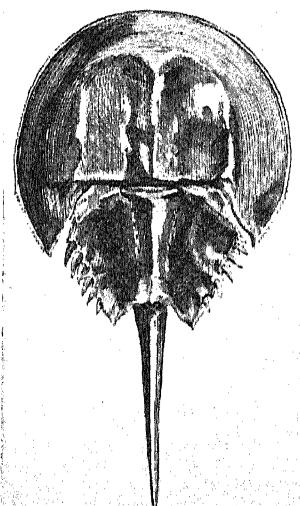
**Scientific Name.** Horse-radish belongs to the family *Cruciferae*. It is classed as *Cochlearia armoracia*.

**HORSESHOE CRAB**, also known as KING CRAB and HORSEFOOT, is a large arachnid found along the Atlantic coast of North America, from Maine to the West Indies. It often reaches a length of nearly two feet, and is called *horseshoe crab* because of the shape of its shell. It lives in deep waters, feeding on worms and shellfish, and comes to the surface only in spring and early summer to lay its eggs. In burrowing into the sand for food, the head, which forms part of the horseshoe

shell, is thrust downward, and the spinelike tail is used as a brace to push the body forward. As food the horseshoe crab is valueless, but the strange object is interesting, as it is one of the last remnants of a strange group of animals which inhabited the world in earlier epochs. For further discussion, see the article KING CRAB. S.H.S.

## Scientific Names.

The exact classification of the horseshoe crab is unsettled. It is not a crustacean (see CRUSTACEANS). Most zoologists place it (with four other tropical species) in the genus *Limulus*, and the order *Xiphosura*, subclass *Merostomata*, class *Arachnida*, subkingdom *Anthropoda*. The American species is *Limulus polyphemus* in this classification.



HORSESHOE CRAB

**HORSESHOE CURVE.** See ALTOONA, PA.

**HORSESHOE FALLS**, the most beautiful part of Niagara Falls (which see).

**HORSESHOE SUPERSTITIONS.** See SUPERSTITION (Protection by Charms).

**HORSETAIL, OR SCOURING RUSH**, names commonly given to species of *Equisetum*. This genus of spore-bearing, rushlike plants is of special interest because it includes the only living representatives of a great prehistoric family, some forms of which were large trees. The horsetails of today are small plants with jointed, grooved, hollow stems that rise from perennial creeping rootstocks. The stems are easily pulled apart at the joints. Fertile and sterile stalks are sometimes borne on the same plant, the former appearing in spring and the latter in summer. The spring shoots end in spore-bearing cones; the summer stalks, when branched, have much the appearance of a small evergreen tree.

Among the species found in North America, the *common horsetail* is a widely distributed weed of Canada and the United States, occurring as far south as Virginia. It is a noxious pest in some regions, because of its poisonous effect on horses that eat it when it is mixed with hay.

B.M.D.

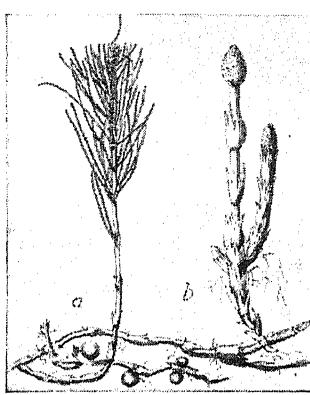
**Meaning of Names.** *Equisetum* is the Latin for *horse bristle*. The name *scouring rush* has reference to the former use of the plants in polishing metal and scouring out milk cans, for all parts contain mineral matter. The horsetail family is known as *Equisetaceae*.

**HORSEWEED.** See FLEABANE.

**HORTICULTURAL BOARD, FEDERAL.** See AGRICULTURE, UNITED STATES DEPARTMENT OF.

**HORTICULTURE**, a word which means, literally, *the cultivation of a garden*. Horticulture, however, has long since outgrown its original significance, for it has developed into an important branch of agriculture, and is itself divided into four main departments—fruit-growing, or *pomology*, relating to the cultivation of orchards; *olericulture*, the raising of vegetables for the home or market; the raising of flowers and ornamental plants, or *floriculture*; and *landscape gardening*.

Just as scientific study has helped man to derive greater profits from the practice of gen-



HORSETAIL

(a) Sterile shoots; (b) fertile shoots.

eral agriculture, so has the development of horticulture taught him how to obtain more satisfactory results in the cultivation of fruits, flowers, and vegetables. The successful horticulturist must know what soils and situations are best suited to the various products of orchard and garden, what special methods of cultivation are required for each plant, and what insect pests or plant diseases are liable to injure its growth.

The principles of horticulture are taught and practiced in agricultural colleges and experiment stations throughout the United States and Canada, and information is widely disseminated through books, bulletins, and periodicals. There is great and increasing interest in home gardening, and garden clubs in cities and rural communities are doing much to encourage the beautifying of the private home grounds. Another evidence of widespread interest is the attention being given to school gardens. This phase of horticulture is being fostered especially by the United States and Canadian Departments of Agriculture.

C.F.C.

**Related Subjects.** The articles in these volumes which will be helpful to the reader interested in horticulture are very numerous—there are articles, for instance, on all the important fruits, flowers, and vegetables. It is not necessary to index these here, however, as they are all listed under their respective group headings. If the following articles, with the *Related Subjects* indexes under many of them, are consulted, the range of reading will be found to be a wide one.

|                              |                     |
|------------------------------|---------------------|
| Agriculture                  | Herbs               |
| Botany                       | Landscape Gardening |
| Burbank, Luther              | Nut                 |
| Disease (Diseases of Plants) | Plant               |
| Flowers                      | School Garden       |
| Fruit                        | Vegetables          |
| Gardening                    |                     |

**HORUS, ho' rus.** See OSIRIS.

**HOSEA, ho' ze' ah**, a prophet in the kingdom of Israel, who began his ministry in the reign



From the painting by Sargent

HOSEA

of Jeroboam II and continued through the reigns of four kings in Judah, a period of over thirty years. Although a contemporary of

Isaiah, he began to prophesy some years earlier, and ceased long before the latter's death. Hosea lived about 750 B.C.

**Book of Hosea**, the first in the Old Testament by the minor prophets, not only in arrangement but also in order of time. It consists of two portions, the first three chapters using the details of the author's own life and his wife's unfaithfulness to him as an illustration of the second part, where he laments the unfaithfulness of the Israelites to Jehovah in introducing idolatry and other shameful rites into their religion.

**HOSIERY**, *ho' zhur ie.* See KNITTING MACHINE.

**HOSMER**, *hahz' mur*, HARRIET (1830-1908), an American sculptor whose art showed a tendency toward the classical. She was born at Watertown, Mass., and studied under John Gibson at Rome. In addition to a fountain in Central Park, New York, and two fountains in private possession in England, she executed ideal heads of *Daphne* and *Puck*. *The Sleeping Faun*, *Waking Faun*, *Zenobia in Chains*, and *Beatrice Cenci* are considered among the best of her works.

**HOSPICE**, *hos' pis*, a place designed to shelter travelers, and usually maintained in connection with a monastery. The hospice of the Great Saint Bernard, in existence as early as 1125, and that of the Little Saint Bernard, both located in the Swiss Alps, are well-known shelters of this type. No fee is charged travelers, although they are privileged to make gifts to the hospices. Nearly everyone is familiar with the stories of the Saint Bernard dogs, which are trained to go out in the snow-covered Alps in search of wayfarers who have lost their direction, and who need succor. See SAINT BERNARD; SAINT BERNARD, GREAT.

**HOSPITAL**, a building or group of buildings in which the sick and injured receive medical or surgical treatment and nursing. Hospitals also receive patients who are not seriously sick, but who need special tests or observation for the purpose of diagnosis. In keeping with the marvelous advance in medicine and surgery, in sanitary science, and in public hygiene, characteristic of the past century, hospital organization and technique have made remarkable progress since the middle of the nineteenth century. The best modern hospitals are clean, airy, conveniently arranged, managed like business corporations, and are centers of scientific research and investigation. Their operating rooms and laboratories are equipped with the latest appliances, and their methods of administering anesthetics, of operating, and of caring for their patients are thoroughly standardized.

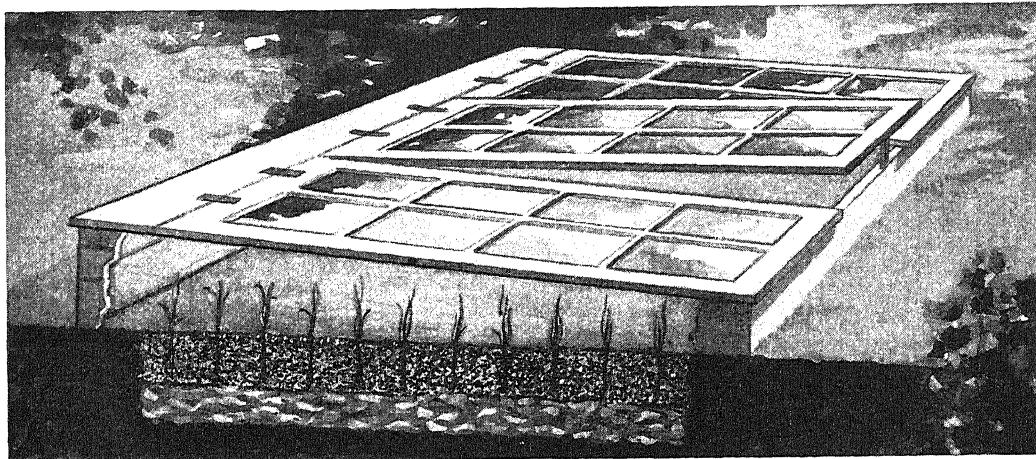
That the hospital is an institution of vital importance to modern welfare is generally conceded. Even those institutions that do not

attain the best standards of equipment and management are much better places for patients requiring professional treatment than the average home. In small towns and in rural communities, there is still need of further development of hospital facilities.

The governing body of a hospital is known as the board of managers; its members are usually appointed by the governor if the institution is under state control, while the board of a private hospital is generally elected by the hospital-association membership. The chief executive officer is the superintendent. Other house officers are a superintendent of the nursing department, a matron, or house-keeper, a steward, who has charge of all food supplies, an engineer, and a pharmacist. Men servants, called orderlies, are attached to the nursing department. Nurses are subject to the orders of *internes*, or graduates of medical schools who reside in the hospital and are in constant attendance for the experience they may gain, receiving no remuneration except their board and lodging. The period of internship varies from one to three years. The internes are under the direction of attending physicians engaged in general practice in the city, who visit the hospital at specified periods, and have oversight of the treatment given the patients. In the best-organized hospitals, each department is under the supervision of a competent visiting staff, and each is provided with a resident physician, internes, and assistants.

Hospitals are divided into two main classes. *General* institutions receive patients of all kinds; hospitals classed as *special* care for particular groups of cases. Thus there are hospitals for contagious diseases, for diseases of the nose and throat, and so on. It is customary now to use the name hospital for the type of institution once called *asylum*. That is, persons afflicted with mental ailments are said to receive treatment in hospitals for the insane. Military and naval hospitals are maintained by governments for the benefit of men in the service. Many railroads and other corporations whose employees are in danger of accident operate their own hospitals, and in large city stores, a hospital room is usually set aside for the use of the employees and to accommodate customers who receive injuries or become ill while shopping.

The first institution organized for the especial purpose of caring for the sick was founded in A.D. 360 at Caesarea, in Cappadocia, by Saint Basil. The rise of monasticism during the Middle Ages was an important factor in the development of hospitals, for nursing was one of the functions of the religious orders of medieval Europe. Many of the hospitals of that period were models of cleanliness and order, though lacking in equipment considered essential to-day. The oldest hospital still in



CONSTRUCTION OF SIMPLE FORM OF HOTBED

existence is the Hotel Dieu, in Paris, which was founded in the seventh century. W.A.E.

**Related Subjects.** For supplementary information, the reader is referred to the following articles:

| Disease | Nurse | Surgery |
|---------|-------|---------|
|---------|-------|---------|

**HOSPITALERS**, *hos' pih tah lurz*. See KNIGHTS HOSPITALERS OF SAINT JOHN.

**HOST.** See ELEVATION OF THE HOST.

**HOST** (in biology). See PARASITE.

**HOSTAGE**, *hahs' tayj*, a person taken as a pledge of security or for the performance of conditions of a treaty or contract. The custom of taking or giving hostages, which was formerly almost universal, had become practically obsolete among modern communities until the outbreak of the World War. During that struggle, cases were recorded in which the invading forces exacted obedience from conquered cities, threatening to take the lives of certain of their inhabitants, whom they held, if conditions of peace were not maintained. The rules governing the rights and treatment of hostages form an important branch of international law. See INTERNATIONAL LAW (War on Land).

**HOSTILIUS, TULLUS.** See ROME (The Period of Legend).

**HOT-AIR FURNACE.** See HEATING AND VENTILATION.

**HOTBED**, a device for germinating seeds and forcing the growth of young plants by raising the temperature above that of the air in the open. A hotbed is made by removing the soil to the depth of six or eight inches from the patch of ground selected, then placing a layer of horse manure and litter in the excavation and covering it with the soil, taking care to make the layer of uniform thickness. The bed is enclosed in a frame made of boards eight or ten inches wide. It is then covered with windows. These may be made especially for the purpose, or storm sash may

be used. The bed should slope gently toward the south, to get all possible sunshine, and be so placed that buildings or trees will not cast a shadow upon it. The sash should be opened daily for ventilation. Plants started in a hotbed are usually transplanted as soon as the season is far enough advanced. Near large cities, extensive hotbeds are used by truck gardeners.

**Cold Frame.** This is a device similar to a hotbed, except that no manure or other fermenting substance is used to increase the temperature. The sun warms the air under the glass. In cool climates, the cold frame is used to harden tender plants after they have been taken from the hotbed, so that they will more readily adjust themselves to the open. In the Southern states, plants are often started in cold frames, and some crops successfully grow to maturity in these beds. C.F.C.

**HOTCHKISS GUN.** See MACHINE GUN (The Hotchkiss).

**HOTEL.** "He who has not been at a tavern knows not what a paradise it is," quotes Longfellow from Pietro Aretino. If the poet from Arezzo could visit a "tavern" built four centuries after his own times, he would repeat his exclamation with a new meaning in the words. In his day, each tavern and inn had only a few rooms for the accommodation of travelers, and if more than half a dozen guests arrived on the same evening, some of them probably had to sleep in a stable loft. It was only as a gathering place for a jolly company of care-free townsmen that the medieval hospitality could be likened to a paradise, but in many a hotel of to-day may be found material comfort, luxury, and splendor far in excess of what Popes and kings of the Middle Ages, with all their wealth, could have commanded. In some of the great hotels of large cities, there are more rooms than in all the inns Aretino could have visited in a year's journey.

Hotels of the present day may be roughly placed in three classes—the *commercial* hotel, the *tourist*, or resort, hotel, and the so-called *family*, or residential, hotel.

The commercial hotels, whose guests usually are people traveling on business, have reached their highest development in America. In New York, Chicago, and San Francisco, there are many with over a thousand guest rooms each, and in a number of other cities there are many nearly as large. America's largest hotel, in number of rooms (over 3,000), is in Chicago. Most of these buildings are of the modern skyscraper type. They require hundreds of servants, and the most enterprising of them contain such conveniences as swimming pools, Turkish baths, and nurseries where children may be left while mothers shop. In the United States, guests are commonly charged on what is called the *European plan*; that is, they are charged a fixed rate per day for rooms and pay extra for meals. The so-called *American plan*, according to which the charge includes three meals a day, is more common in Canada than it is south of the international border.

In recent years, it has become customary for hotels in different cities to be associated under the same ownership or management, so that each advertises the other. Perhaps the most famous hotel chain is that which includes the Ritz Hotel in London and the Ritz-Carlton hotels in New York and Philadelphia; another famous chain, confined to the United States, is known as the Statler group. In Canada the Canadian Pacific Railway operates hotels in various centers reaching across the continent.

In America, summer and winter hotels and hotels for tourists are often larger than commercial hotels, though not usually so well constructed. In Europe, however, tourist hotels are often the best. The smaller ones, conducted more or less in boarding-house fashion, are called *pensions*.

**The Hotel-Keeper and His Guests.** In law, hotel proprietors are known as *innkeepers*. Like a railroad, which is a *common carrier*, and a street railway, which is a *public utility*, a hotel-keeper has certain legal obligations to the public. He is obliged to admit all respectable persons as guests and furnish them lodging at reasonable rates, unless, of course, his house is filled. By the common law, he is also responsible for the safekeeping of the property of guests, but in most states and provinces, statutes provide that if he furnishes a safe and so notifies his guests, he is relieved of responsibility except for goods deposited in it. In return for his liabilities, the innkeeper has privileges, chief of which is a lien on guests' property until all bills are paid.

**HOTHOUSE.** See GREENHOUSE.

**HOT SPRINGS.** See SPRING; THERMAL SPRINGS; ARKANSAS (Mineral Springs).

**HOT SPRINGS NATIONAL PARK**, Ark., one of America's most famous health and pleasure resorts. It is the county seat of Garland County, and is situated southwest of the geographical center of the state, fifty-five miles southwest of Little Rock, the capital. Prior to 1922, the place was officially known as Hot Springs.

The city has a picturesque location 600 feet above sea level, in a sheltered valley of the Ozark range. On the side of Hot Springs Mountain, within an area of ten acres, are found forty-six hot springs, which yield daily about 830,000 gallons of clear, tasteless, odorless water possessing curative properties. These springs are said to possess radioactivity to a marked degree, and their waters are prescribed for relieving arthritis, neuritis, high blood pressure, rheumatism, and various other physical disorders. Drinking fountains on the thoroughfare are provided, where, at any time during the day, groups of health-seekers with their collapsible drinking cups may be seen.

Some of the most palatial bathhouses in the United States are found in Bath House Row, the pride and showplace of the resort.

It is said that the Indians were the first to discover the curative properties of the springs. Dunbar and Hunter, of the Lewis and Clark Expedition, visited the site in 1804, and a settlement was made in 1807. Since 1832 it has been a national reservation, and the springs are owned and controlled by the United States government. A city charter was granted in 1879.

Throughout the year, especially in winter, as many as 300,000 people are attracted to the resort. Permanent population, 12,000, of whom one-fourth are colored.

Hot Springs is primarily a resort city, and its chief industrial plants are lumber mills. The Chicago, Rock Island & Pacific and the Missouri Pacific railways serve the city. On Hot Springs Mountain the United States government has established an army and navy hospital; there are five other hospitals and a state orphanage.

F.L.B.

**HOTTENTOTS**, an African race, the original inhabitants of the Cape of Good Hope Province, now a part of the Union of South Africa. They are in many ways a peculiar race, and have been long held in low esteem by the darker natives of Africa. The Hottentot is of small stature, and has a dirty, livid, yellow complexion, thick lips, flat nose with wide nostrils, and large ears. The hair is coarse and woolly, and the men have very scanty beards. Young Hottentot girls are considered attractive. They marry very early, sometimes at the age of eleven or twelve. After marriage they age very quickly, and when only in the twenties, they may appear old and shriveled.

The females are held in deep respect by the males, but they do nearly all the work, the

men only tending their cattle and curing hides. There are probably not more than 90,000 true Hottentots, although they formerly numbered 200,000 and were once rich in cattle. The early Boer settlers in Africa waged constant war on them, and the survivors of the seven tribes composing the race were scattered to all parts of South Africa.

The origin of the Hottentots has been a puzzle to anthropologists, but it is now believed that they



A HOTENTOT BELLE

are a cross between the Bushman, the latter element being seen in their yellow color, prominent cheek bones, and pointed chin. In physical characteristics, they show many variations from other negroid types. See BANTU; BUSHMAN. C.W.

**H O T - W A T E R HEAT.** See HEATING AND VENTILATION.

**H O U D I N , o o - da N' , ROBERT.** See CONJURING.

**H O U D I N I , hoo - de' ne , HARRY** (1874-1926). The radio, the airplane, electricity, television—these are more mysterious than the illusions commonly offered by the performers of magic. Yet the public has not only accepted the feats of magicians as fine examples of skill, but has frequently attributed to such persons more than normal powers. Houdini, the greatest magician of his time, always refused to recognize any element of supernaturalism. He maintained that everything he did was accomplished by material means, and that his feats could be explained so that any one of normal intelligence could understand them. He particularly disclaimed any mediumistic or spiritualistic powers, which were attributed to him by Sir Arthur Conan Doyle and others.

Houdini was born in Appleton, Wis., the son of Rabbi Meyer Samuel Weiss. His real name was Eric, but for professional reasons, he legally took the name Harry Houdini. His work as an entertainer began in his youth, when he traveled with a circus as a trapeze-



A TYPICAL MALE

performer. Later he developed an act consisting of tricks of magic and skill, especially those which pertained to releasing himself from handcuffs and other forms of restraint. He became so adept in the latter that he gradually devoted his entire attention to this kind of performance.

For purposes of publicity, it was his custom to escape from the prison of the city he was visiting, or, by some other spectacular event, call attention to his prowess. In 1902 he escaped from the cell in the Federal prison in Washington which had been occupied by the assassin of President Garfield. He also performed such feats as freeing himself after being manacled and nailed in a box, escaping from a strait-jacket while hanging from the roof of a tall building, and allowing himself to be bound and nailed in a box and thrown into the water. These and many other dangerous acts he performed with great success and apparent ease. His fame became world-wide, and he gave performances in the important cities of every continent.

Houdini would not disclose his methods, even to those nearest him. He gave as a reason for this secrecy: "I hope to carry these secrets to

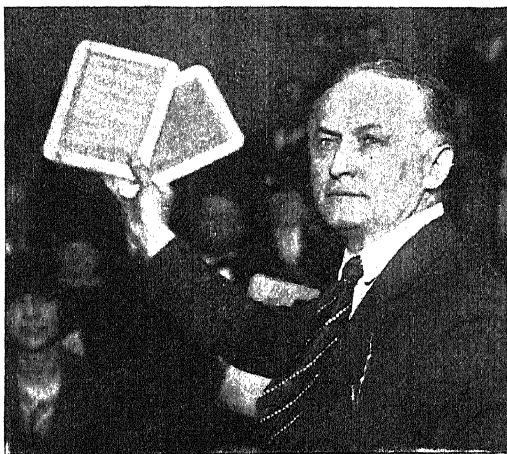


Photo: U &amp; U

THE MAGICIAN HOUDINI

The illustration shows him before a committee of the Congress of the United States, in a demonstration of what he declared to be the fraud practiced in so-called slate-writing.

the grave, as they are of no material benefit to mankind, and if they should be used by dishonest persons, they might be a serious detriment."

He was very modest in estimating his achievements, and did not hesitate to say that his ability was often overestimated. Some of his conclusions, based on a successful career of "entertainment based on natural laws," as he called it, will be of interest. Referring to the fallibility of human observation and judgment,

he said: "The mind of the average person accepts what it sees and is not willing to apply the laws of physics, no matter how much or how glaringly the act defies the fundamental principles upon which our very existence depends." He also said, "The average human mind is utterly unable to describe accurately anything he or she has witnessed." These observations show his keen powers of analysis and his entire honesty of purpose.

His death resulted from an accidental injury from a blow delivered in sport by a student of McGill University, Montreal.

Houdini was president of the Society of American Magicians, and a member of the Authors' Club, London. He wrote several books on magic and spiritualism.

**HOUDON**, *oo dawn'*, JEAN ANTOINE (1741-1828), was acclaimed the greatest French sculptor of the eighteenth century. He executed over 200 busts of eminent men and women, including Washington, Franklin, Napoleon, Lafayette, Mirabeau, and Rousseau (see Bust).

Houdon was born at Versailles, where, in 1800, a statue of him was erected. When he was only thirteen, his work began to attract attention. In 1761 he won the *Prix de Rome* (the Prize of Rome), and continued his studies in that city for over ten years. Upon his return to Paris, he became professor at the Ecole des Beaux-Arts. In 1785 Houdon visited America with Franklin, and during his stay executed a statue of Washington, which now stands in the rotunda of the State Capitol at Richmond, Va. Among his other important statues are those of Voltaire and Cicero. Additional pieces of note are the familiar *Ecchoré* and his *Diana the Huntress*, made for Catharine of Russia. His works are notable for technical skill, and show his complete mastery over his material.

**HOUGH**, *huf*, EMERSON (1857-1923), an American novelist whose writings gave the reading public many vivid stories of the building of the great West. He was born in Newton, Ia., and was graduated in 1880 from the University of Iowa. Hough was able to make his stories of Western life extremely realistic because he was an insatiable student of history, and had acquired, through travel and exploration, a thorough knowledge of the newer parts of the American continent. It was through his efforts that Congress passed the act for the preservation of buffalo in Yellowstone Park. He began his literary career in 1895, and continued to write with considerable regularity until his death.

**Summary of His Work.** Hough's first novel to attract attention was *The Mississippi Bubble*, published in 1902, a book which he said had taken him twenty-five years to write. His most famous story, up to the year of his death, was probably *Fifty-four Forty or Fight*. In the year preceding his death,

he had completed one of his best works, *The Covered Wagon*, a story portraying the vicissitudes and hardships of the overland trail to California and Oregon just before the discovery of gold in 1848. After *The Covered Wagon* appeared in print, the story was reproduced as a moving picture, and became an outstanding success.

In addition to the stories mentioned above, Hough wrote *The Girl at the Halfway House*, *The Way to the West*, *The Law of the Land*, *Heart's Desire*, *The Way of a Man*, *The Sowing*, *The Young Alaskans* (a series), *The Purchase Price*, *The Lady and the Pirate*, *The Magnificent Adventure*, *The Man Next Door*, *The Broken Gate*, *The Way Out*, *The Sage Brusher*, *The Web*, *North of 36*, and the posthumous *Mother of Gold*.

**HOUND**, a name given to all breeds of dogs, with one exception, which hunt their quarry by scent. The greyhound, in spite of its name, does not come under this heading, as it hunts entirely by sight. All hounds, though they vary greatly in appearance, are originally derived from the South Europe hound, or talbot. The bloodhound is nearest in type to the original breed, which has changed in some cases so greatly that no resemblance to the talbot remains. Some hounds have rough coats, while others are smooth-haired; it is a curious fact that rough-haired hounds show great affection for men, while the other varieties appear indifferent to them. The most commonly known hounds are the bloodhound, staghound, foxhound, beagle, and dachshund. Descriptions of these will be found in these volumes under their respective titles. See DOG. M.J.H.

**HOUR**, one twenty-fourth of an astronomical day, or one-twelfth of the ordinary day. The ancient Hebrews did not divide their day into twenty-four parts. Morning, noonday, and evening were the only distinctions made. It is not known when they began to divide the natural day into twelve equal parts. In *Nehemiah* IX, 3, it is implied that the day was divided then into four parts, and Christ's parable of the laborers in the vineyard, *Matthew* XX, 1-5, seems to confirm this supposition. It was probably during the Babylonian captivity that the Jews learned to divide the day into twelve parts. In ancient times, the night was divided into three "watches"—sunset to midnight, midnight to the cock's crow, cock's crow to sunrise. When Judea became a province of Rome, four instead of three "watches" were adopted, and these are frequently mentioned in the New Testament. It was not until the latter part of the fourth century that our present division of the day into twenty-four hours was adopted by people generally. See DAY; CALENDAR.

**HOURGLASS**, a device used for measuring time before the invention of clocks. It consisted of two glass bulbs, placed one above the other and united by a narrow neck, through which a quantity of sand, or sometimes mer-

cury, ran in exactly one hour. When all the sand passed into the lower part, the instrument was reversed. Similar devices intended to measure shorter intervals were also appropriately named, as, for example, a half-hour glass. A smaller instrument of like construction, used to indicate the time required for boiling eggs, was called an egg glass. Devices patterned on the same principle are still used in some countries by sailors for the purpose of measuring the time during which the logline is allowed to run out. However, the hourglass in all its variations is now practically a curiosity which emphasizes the inventive genius of mankind.

**In Literature.** Writers use the term figuratively to denote the passage of time. Shakespeare says, in *The Merchant of Venice*:

I should not see the sandy hourglass run  
But I should think of shallows and of flats.

Longfellow has a poem on *Sands of the Desert in an Hourglass*, and Douglas Jerrold, in *Time*, varies the usual reference:

To the true teacher, time's hourglass should still run gold dust.

**HOUSATONIC**, *hoo sa ton' ik*, RIVER, a New England waterway that is of great importance in supplying water power to manufactures. It rises in the Berkshire Hills in Massachusetts, and flows southward through Connecticut, entering Long Island Sound about four miles east of Bridgeport. The tide ascends to Derby, fourteen miles from the Sound. Throughout its course of 150 miles, the river flows through a country noted for its scenic beauty. See MASSACHUSETTS (Coast and Rivers).

**HOUSE**, in astrology, one of the twelve portions into which the heavens have been divided, and through which the heavenly bodies pass every twenty-four hours. Each house is supposed to have its specific functions, as follows: (a) the house of life; (b) fortune and riches; (c) brethren; (d) parents and relatives; (e) children; (f) health; (g) marriage; (h) death; (i) religion; (j) dignities; (k) friends and benefactors; (l) enemies. The six houses



HOURGLASS

Drawn from a typical hourglass of a day when such devices were in use.

above an astrological dividing line are called *ascendant*; the six below, *descendant*. See ASTROLOGY; ZODIAC.

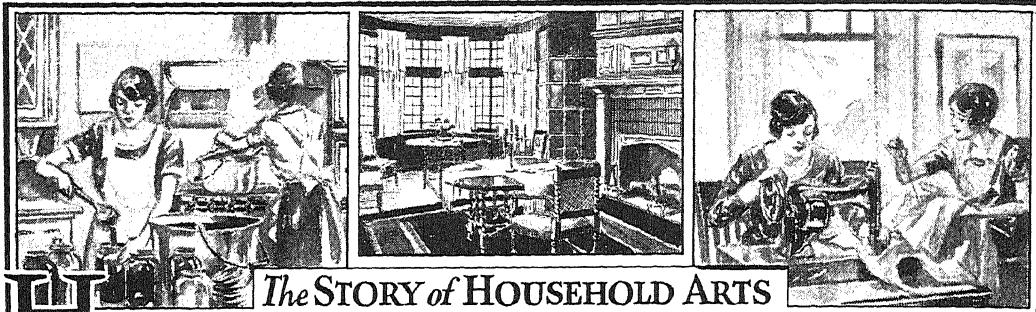
**HOUSE**, EDWARD MANDELL (1858- ), an American statesman who played a major rôle in national public affairs from 1912 to 1920. He was born in Houston, Tex., and was educated at Cornell University. Before the election of Woodrow Wilson to the Presidency, House had been active politically in his native state, and had been on the governor's staff, thereby acquiring his title of colonel, but he declined to take part in national Democratic politics. However, in 1912 he used his influence to have Wilson nominated, and, later, to have him elected. He was offered a Cabinet position, but, in accordance with his usual policy, refused to hold office. His freedom gave him more power than any official position offered, and he became Wilson's most trusted adviser. Colonel House's interest in and knowledge of foreign affairs made his service invaluable during and after the World War. In July, 1914, he almost succeeded in effecting a meeting between English and German diplomats which might have averted war.

With the entrance of the United States into the war, House's position became more important, for he represented his country in the councils of the allied statesmen who were considering war needs. Wilson appointed him a member of the American commission at the Versailles Peace Conference. He had assisted the President in drawing up the Fourteen Points and the covenant for a League of Nations, and succeeded in pledging the Allies to accept them.

After a break with President Wilson, in 1919, Colonel House retired from public life. He edited *What Really Happened at Paris* and *The Intimate Papers of Colonel House*, and wrote a political romance, *Philip Dru*.

**HOUSEBOAT**, a floating home, occupied for the whole or a part of the warm season of the year, and therefore one of the very numerous devices for the enjoyment of the people. This is the American view of the houseboat, but not that of many peoples of the Orient, particularly of the Chinese and some native tribes of the South Seas. In China the dense population has crowded thousands into permanent homes on boats, where their entire lives are spent; many go ashore only at rare intervals (see illustration, page 1178).

The American houseboat is popular on lakes and rivers. Such a summer home may be roughly built on a scow, with only one room, or two at most; it may contain furniture limited to actual needs. On the other hand, some houseboats are large and as sumptuously furnished as the town house of the owner. These boats may be poled or towed from one mooring place to another.



# H

## The STORY of HOUSEHOLD ARTS

**H**OUSEHOLD ARTS IN EDUCATION. To teach how a home may best be conducted is the purpose of the household arts in the schools. It means the application of science to the preparation of food, the cleaning of the house, and the clothing of the family. It means that the nation recognizes the importance of good homes and has directed its schools to provide more skilful workers and more efficient managers for them. It means that the housewife is to be trained for her work as the doctor or lawyer is trained for his profession.

As studied in schools and colleges, the household arts have usually included four general subjects—shelter, food, clothing, and household management. The first three of these are evidently the chief material factors with which a family deals in a home—the house itself and its furnishings, the daily service of food, and the providing of personal clothing; and each of these is a matter of concern to the family from three points of view: as regards, first, its *selection*, or the original choice of house, food, or clothing; second, as regards its *preparation*, or the household processes of making things ready for use, and storing, repairing, renewing after use; and third, as regards its *actual use* in supplying the recurring needs of the family. *Management*, or the fourth topic in household arts, considers the general problems of organizing and directing the immediate business of the household, the performance of its work, the expenditure of its money, the care of the members of the family, and the supervision of the home life. Foods and clothing have been chiefly emphasized in household-arts teaching, but recently, shelter, and especially management, have received increased attention.

**Why It Is Important.** As the household largely controls the health, individual efficiency, and character of its members, housekeeping is evidently a matter of vital national concern. From the family each of us receives at birth the gift of life, and through the family group, largely, each receives his religious beliefs, his ideas of right and wrong, his fundamental virtues, and especially that ability to coöperate with others which makes possible social life

and organized business and government. In connection with the study of household arts, this broader significance of the family may be at least suggested, and the ideals that underlie the modern home, such as the essential partnership of husband and wife, the equality of woman with man, the rights and duties of children, may be impressed upon young people so as to guide them in their later home life. Household arts are also especially important as a vocational study for the girl, since skill in this field is not only a means of earning money after leaving school, but later has a direct practical value in her own home in case of marriage; other vocational training of the girl, as in industry, ordinarily becomes useless when she marries and becomes a home-maker.

**How Household Arts Came into the School.** The household arts are part of a new school program, that of vocational education, which would train every worker for his work, whether it be that of the farm, the shop, the store, or the home. This is to be effected, not by curtailing the individual's general or academic education, but by adding to his general purpose. Thus household arts as vocational training is a supplement to, not a substitute for, the general education of the girl. Beginning with the Industrial Education Commission of Massachusetts in 1906, which resulted in a law giving state aid to vocational instruction in agriculture, the industries, and household arts, special legislation has since been adopted in about twenty states, and every state has felt the impulse of the movement for establishing vocational schools. The United States Congress has regularly voted large appropriations for teaching agriculture and household arts in rural districts. In the last few years, there has thus come about a rapid extension of household-arts teaching on the vocational basis.

But influences other than the vocational-education movement have helped to bring household arts into the schools. *Manual training*, or simple hand activities, introduced as a supplement to book study, and intended to improve general education rather than give vocational efficiency, came into many schools, beginning about 1880, with a program that included

cooking and sewing for girls. A fundamental influence favoring household-arts teaching has been the modern application of natural science, chemistry, physics, and biology to practical affairs. As early as 1857, Youmans' *Handbook of Household Science* outlined the relations of various sciences to the household, and to-day there is a great and growing body of scientific knowledge available for teaching in household-arts courses.

The modern social-welfare movement, which would assure to every person the essentials of a decent living by reducing the causes of misery and promoting the conditions of well-being, has helped secure a place for household arts. The first widespread organization of such instruction was the philanthropic "kitchen-garden" classes, beginning about 1876; to-day the social-work aspect of household arts is increasing through settlement classes, housekeeping centers, visiting housekeepers to teach better ways of living, factory and store welfare work, school centers, and rural-community work. Household-arts education has also received an impetus from the woman's movement, so-called, for as woman's interests have received a hearing in law, business, politics, and other fields, the household, which is woman's great vocational field, has had recognition in the schools. Primarily, then, the household arts in education are a result of the new vocational-education movement, but manual training, the application of science to practical affairs, the recognition of woman's interests, and the modern emphasis on social welfare have each helped to open the way.

**The Educational Program.** Preparation for home life has long been one of the aims of education, as in the kindergarten, which has chosen its gifts and games to illustrate home, church, and state, and in the modern elementary school, which introduces informational lessons from the child's world of home, street,

and playground. Household-arts study, however, has brought into the school the practical processes involved in housekeeping and the systematic knowledge underlying them. As organized in typical schools, one finds, in the first six grades, simple lessons in cooking and sewing, which are often given to boys and girls alike. Sometimes this is part of a comprehensive program of activities chosen from farm, shop, store, and home, to give industrial and social knowledge for later intelligent choice of a vocation. In the last grades of the elementary school and in the high school, the girls usually study cooking, sewing, and housework, intensively, with the aim of acquiring vocational knowledge and skill. In all household-arts teaching, two elements enter—*theory*, or the explanation of processes, and *practice*, or exercises for the sake of skill; emphasis may be on theory or on practice, according to the purpose of a particular course. However, in vocational instruction the final aim is skill in the profession of home-making, or in some special vocation related to household arts, such as cooking, dressmaking, millinery, or management. Some courses go to the other extreme and emphasize scientific explanations.

For the high-school girl who goes to college, the state universities and technical colleges usually credit, for college admission, high-school work in household arts, but some academic colleges do not. In these higher institutions, the household-arts student may take a general home-making course which gives due attention to shelter, foods, clothing, and management, or she may specialize in any one of the vocations based on household arts—dressmaking, costume-designing, house decoration, dietetics, food inspection, consulting or managing housekeeping, tea-room or restaurant or dining-room management, household-arts journalism, lecturing on household subjects, and, especially, the teaching of household arts. The latter offers



GAINING PRACTICAL EXPERIENCE  
Mother is instructing daughter in the art of marketing.

a wide range of opportunity, with specialization possible in various subjects, such as foods and cookery, textiles, clothing, and management, and also in various types of work such as that of the elementary teacher or supervisor of household arts, high-school or college teacher, rural-extension worker, supervisor of girls' canning clubs, and teacher of continuation classes. This last type of work, continuation classes, under the encouragement of laws on the subject, is making available in every community, urban and rural, an opportunity for young women who are at work or at home, for mothers, and for employed houseworkers, to study the practical elements of cooking, sewing, care of children, home nursing, and other aspects of housekeeping, in daytime or in evening classes for a few hours a week.

The girl who is considering whether she will study household arts beyond the high school should make inquiries as to courses given by the normal schools and the colleges or university of her state or province; she might well also examine the courses of such institutions as the University of Chicago; Teachers College, New York City; and Simmons College, Boston. In the universities, she will find opportunity for training in research and investigation in the household-arts field, which itself is coming to furnish a profession for a limited number of persons, as in the investigations of the Department of Agriculture in Washington and of certain of the universities.

**Practice.** In studying household arts, one should use every opportunity for practical experience. Wise parents will let the daughter cook for a time, or do the marketing, or keep household accounts. All children should begin early to share in certain household duties; a small allowance to be used for some purpose, as the purchase of clothing, will teach money values and responsibility. It is a wise rule to consider one's own home and see whether what is studied in household arts may not be applied there—such as conveniences in the kitchen and definitely planned *menus*. It is with the same purpose of adding experience to theoretical knowledge that, in many high schools, the girls in household arts do practical work in the school lunch room, or undertake the serving of tea or simple catering in private homes, or help as "accommodators" in getting dinner or washing dishes, on order for a family. In the best colleges, there is a similar emphasis on practical field work in lunch rooms, catering service, practice houses, or apartments, and in private homes. Experience is as necessary for the household-arts expert as is hospital work for the doctor.

**Related Subjects.** The reader is referred in these volumes to the following articles:

Costume  
Domestic Art  
Home Economics

Industrial Art  
Interior Decoration  
Sewing

**HOUSELEEK, OR LIVE-FOREVER**, common names of a genus of interesting plants possessing characteristic fleshy leaves that tend to form compact rosettes. The *common houseleek* grows wild on Alpine rocks, and is also seen about homes all over the continent of Europe, where it is esteemed as a cover for walls and roofs. The purplish star-shaped flowers grow on upright stems a foot or less in height. Their petals, which equal in number the sepals, or divisions of the calyx, are inserted at the base of the latter. The cut or bruised leaves of the houseleek are said to allay the pain of burns and bee stings. *Live-forever* is applied to the plant with reference to its hardiness. It has been brought to the United States, and is there often regarded as a weed.

B.M.D.

**Scientific Name.** The houseleeks belong to the family *Crassulaceae*. The common species is *Sempervivum tectorum*.

**HOUSEMAID'S KNEE**, an acute or chronic inflammation of the knee, so named because housemaids are especially susceptible to it, because of frequent kneeling to clean floors and steps. The affliction is one of the bursa, or sac, between the patella (knee pan) and the skin. The swelling, which is superficial, takes place in front of the patella, but should not be mistaken for inflammation of the synovial membrane lining the joint. In the latter case, the swelling is at the sides of the knee.

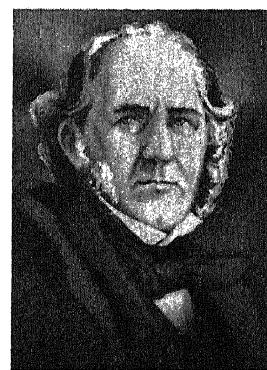
**HOUSE OF COMMONS AND HOUSE OF LORDS.** See PARLIAMENT.

**HOUSE OF REPRESENTATIVES.** See REPRESENTATIVES, HOUSE OF; CONGRESS OF THE UNITED STATES.

**HOUSE SNAKE.** See MILK SNAKE.

**HOUSE THAT JACK BUILT.** See RHYMES OF CHILDHOOD.

**HOUSTON, hu'-stun, SAM** (1793-1863), an American soldier and political leader, the leading figure in the struggle through which Texas gained its independence from Mexican rule. When he was thirteen years of age, his family removed from his native Kentucky to the eastern frontier of Tennessee. Tiring of school and of a position as clerk in a trader's store, Sam ran away when he was about fifteen, and for nearly three years lived with the Cherokee Indians of East Tennessee. On his return to civilization, he



SAM HOUSTON

President of the republic of Texas and later Senator from Texas in the United States Congress.



Photo: U &amp; U

AIRPLANE VIEW OF HOUSTON'S BUSINESS CENTER

opened a country school, then enlisted in the United States army, and served under Andrew Jackson in the war against the Creeks. Later, he studied law at Nashville, beginning practice in Lebanon, Tenn., and in 1822 was sent to Congress. Five years later, the Jackson Democrats elected him governor of Tennessee.

In 1832, while on a visit to Texas, Houston accepted the invitation of the American colonists of that province to become their leader in the struggle for independence. At the head of a small company of raw volunteers, he conducted the military movements which led to the defeat of Santa Anna in the famous Battle of San Jacinto, April 21-22, 1836, and the following September was elected President of the new Republic of Texas. This position he held again from 1841 to 1844. He was the leading spirit in bringing about the admission of Texas into the Union in 1845; he represented the state in the United States Senate from 1846 to 1859; and was its governor from 1859 until the outbreak of the War of Secession. He then retired to private life. The city of Houston, Tex., was named in his honor. See TEXAS (History); SANTA ANNA.

**HOUSTON, TEX.**, the county seat of Harris County and the third city in size in the state, ranking next to Dallas and San Antonio. It is located fifty miles northwest of the coast line of the Gulf of Mexico, on Buffalo Bayou, an inlet of the Gulf that has been transformed into a ship canal by the Federal government

and the citizens of Houston and Harris County. This canal gives the city direct water communication with the ocean. Including the great turning basin in Houston, the channel is fifty-four miles long, and on its banks more than fifty industries have been established. Population, 1920, 138,276 (no later Federal figures available). A local estimate in 1929 placed the number of people at about 250,000.

Houston is attractively situated in a timber country, and is connected with near-by towns and beaches by excellent shell-paved motor highways. The city is noted for its beautiful magnolia trees. It has a fine park and boulevard system covering over 2,000 acres.

**Transportation.** The city is an important railway center, having the service of eighteen roads. The more important of these are the International & Great Northern; the Gulf, Colorado & Santa Fe; the Southern Pacific; the Missouri, Kansas & Texas; the Gulf Coast Lines; and the Missouri Pacific System. Several electric and motorbus lines radiate from the city, and sixty-three steamship lines operate by way of the Houston Ship Channel to the Atlantic and Pacific seabards and to the principal ports of the world.

**Industries.** Houston is a great cotton market and cotton-shipping center, and carries on an extensive lumber industry. There are, besides, eight large oil refineries, five rice mills, and several cotton compresses. There is a heavy commerce in these and other commodities.

**Institutions.** In Houston are located the Rice Institute, a university with a private endowment of \$14,000,000; a Junior College, Carnegie Lyceum and Library, and a large municipal auditorium.

**History.** The city was settled in 1836 and named in honor of General Sam Houston (which see). It was the capital of the Republic of Texas during 1837-1839 and 1842-1845. In 1907 the city adopted the commission form of government. The Democratic convention that nominated Alfred E. Smith for President met in Houston in 1928. B.R.

**HOUTOU, hoo' too.** See MOTMOT.

**HOVAS.** See MADAGASCAR.

**HOVENWEEP MONUMENT.** See MONUMENTS, NATIONAL.

**HOWARD, BRONSON.** See DRAMA.

**HOWARD, CATHARINE.** See HENRY (VIII, England); TOWER OF LONDON.

**HOWARD COLLEGE.** See ALABAMA (Education).

**HOWARD UNIVERSITY,** a school for the higher education of the negro race, located in Washington, D. C. It is regarded as the leading institution of its kind in the world for colored students. There are ten departments of study, both academic and professional, all leading to degrees. Its academic departments have been accorded the highest rating given to American colleges; the college of education has been highly commended for the service it is rendering in supplying qualified teachers for the colored race.

The medical department has acquired new buildings and an endowment, having a total value of a million dollars. The law school has had a continuous existence since 1870; from it are graduated one-third of all the negro lawyers of the United States. The faculty of the university contains the largest aggregation of negro scholars that has ever been brought together. The annual enrollment is about 2,500.

**Related Subjects.** The reader is referred in these volumes to the articles NEGRO; FISK UNIVERSITY; HAMPTON NORMAL AND AGRICULTURAL INSTITUTE; ALABAMA (Tuskegee Normal and Industrial Institute).

**HOWDAH, hou' dah,** the cage on the back of an elephant, occupied by big-game hunters. See TIGER (How Tigers Are Captured).

**HOWE,** the family name of two brothers who were British soldiers, and who fought for England in the struggle with the American colonies.

**Richard Howe, Earl** (1726-1799), was one of England's distinguished naval officers during its numerous wars of the eighteenth century. He began his career at the age of fourteen and rose steadily in fame and position. When the American Revolution broke out, he was created vice admiral. In 1776 he was given chief command of the British fleet in American waters, where he co-operated with his brother, General William Howe (see below). After the close of the Revolutionary War, Howe was made First Lord of the Admiralty, and in 1793, when England and France opened hostilities, he took command of the Channel fleet. The following year he won the great victory

known as that of "the glorious first of June," and was made a Knight of the Garter by George III. Three years before his death, Howe was created admiral.

**Sir William Howe** (1729-1814), younger brother of Admiral Howe, saw his first military service in Flanders, at the age of seventeen. During the French and Indian War, having risen to the rank of lieutenant colonel, he fought at the siege and capture of Louisburg and was one of General Wolfe's officers in the attack on Quebec (see QUEBEC, BATTLE OF). Three years before the outbreak of the American Revolution, he was promoted to the rank of major general, and in March, 1775, was sent with reinforcements to the relief of General Gage at Boston. Howe led the British at the Battle of Bunker Hill, and in October, 1775, succeeded Gage as chief in command of the British army of the colonies. Though he was successful in his campaigns of 1776 and 1777, winning the battles of Long Island, White Plains, and the Brandywine, and occupying Philadelphia, he did not accomplish the defeat of the American cause, as he had hoped to do, and in 1778 was succeeded by Sir Henry Clinton. Howe was rewarded with the rank of full general in 1783. See REVOLUTIONARY WAR IN AMERICA.

**HOWE, ELIAS** (1819-1867), the inventor of the first practical sewing machine, a device that revolutionized the dressmaking industry and has immeasurably lightened the burdens of women throughout the world. Howe was born in Spencer, Mass., where in his youth he worked as a mechanic in his father's mills. While employed in a machine shop in Cambridge, Mass., he conceived the idea of a machine that would take the place of hand labor in sewing. An old school friend having made him a loan of \$500, Howe succeeded in completing a model of his machine in 1845. The following year he secured a patent, but it was only after a long period of poverty and discouragement that he gained any substantial reward for his ingenuity and perseverance.

There was so much opposition to the new machine in America that in 1847 the young inventor went to England, hoping to obtain financial assistance from capitalists in that country. In this he was disappointed, and after selling the English rights to his invention for \$1,000, he returned to America. During his absence, several manufacturers had infringed upon his patent rights, and he found a number of sewing machines on the market. To protect his invention and establish his



Photo: Brown Bros.

ELIAS HOWE

patent, Howe was forced to spend long years in wearisome lawsuits, but he finally won, and eventually he earned a great fortune by manufacturing sewing machines and through royalties from other manufacturers. Howe was one of the Connecticut volunteers in the War of Secession. In 1867, the year of his death, he received the gold medal and the cross of the Legion of Honor at the Paris Exposition. See SEWING MACHINE.

**HOWE, JULIA WARD** (1819-1910), a distinguished woman whose activities covered the fields of authorship, philanthropy, and politics. Her best-known poem, which thrilled the North and was sung with patriotic fervor for many years, was *The Battle Hymn of the Republic*; it was written while she was visiting military camps near Washington in 1861, soon after the outbreak of the War of Secession, and has been called the "Marseillaise of the unemotional Yankee." After the slavery question had been settled, Mrs. Howe became active in the causes of woman suffrage, prison reform, and universal peace. She was likewise interested in clubs, notably the New England Women's Club, of which she was made president in 1872.

Mrs. Howe was born in New York City, but spent much of her life in Boston. She retained her brilliant intellectual powers and humor to the last, dying at the age of ninety-one, one of the most revered women of her time. One of the stories which shows her famous use of repartee tells of her acknowledgment of a card: "Greetings to Boston's greatest Trinity—Howe, Higginson, and Hale." "Well," she exclaimed, "they can't say that we drop our 'H's' in Boston."

Mrs. Howe was the wife of Dr. Samuel G. Howe, for many years superintendent of the Perkins Institution for the Blind.

**Her Writings.** Among her volumes of poems are *Passion Flowers* and *From Sunset Ridge*; her prose writings include *A Trip to Cuba*, her fascinating *Reminiscences*, and *Sex and Education*.

**HOWE, SAMUEL G.** See BOSTON (Educational Institutions); BLINDNESS (Education of the Blind); BRIDGMAN, LAURA.

**HOWELL, CLARK** (1863- ), editor of the Atlanta (Ga.) *Constitution*, was born in Erwin-ton, S. C., but from childhood has lived in Atlanta. When he was twenty years old, he

was graduated from the University of Georgia, and immediately went into newspaper work on the *Constitution*, under the direction of his father. He was at first night city editor; when Henry W. Grady died, he succeeded him as managing editor; and when his father, who was editor in chief, retired in 1897, the son took his place.

Clark Howell became a member both of the state house of representatives and of the senate, was for years a member of the national Democratic executive committee from Georgia, and was elected a trustee of the University of Georgia. He figured conspicuously in many political campaigns, one of the most memorable of which was the campaign of 1906, in which he opposed Hoke Smith for the Democratic nomination for governor, and was defeated. An eloquent and forceful orator, Howell is in great demand for public speeches.

**HOWELLS, WILLIAM DEAN** (1837-1920), a novelist, poet, editor, and literary critic, the high and enduring character of whose writings gave him undisputed claim to the title "dean of American letters." The founder of the late nineteenth century school of realistic fiction, Howells made the most permanent contribution to the development of the American novel of any writer of his time. He was a prolific, although a very deliberate, author; almost every year after 1871, he published a book.

**His Life.** Howells was born in Martin's Ferry, O., where the family lived in a small brick house built by his father "with his own capable hands." In 1840 they removed to Hamilton, O., the scene of one of the author's later books. In *A Boy's Town* he has described his life in Hamilton. The book is a simple chronicle, remarkable for the homeliness of its incidents and for the keen insight shown in their portrayal. We have a portrait of a boy who was tanned and barefooted, who liked to go swimming oftener than his mother permitted, and who disliked the "chores" of carrying in wood and weeding the garden. The treatment is sincere, and reflects both the humor and the pathos which are common to boyhood everywhere. Howells liked games and amusements and was fond of animals, especially dogs. Later he speaks of a pet bulldog which used to climb into the buggy with him, "with a confidence in my reciprocal tenderness which I was anxious not to disturb by the least movement."

Photo: Brown Bros.  
JULIA WARD HOWEPhoto: Brown Bros.  
CLARK HOWELL

The father owned and published newspapers in Hamilton and Dayton, and the son learned the printer's trade, and, by degrees, the whole business of managing a daily paper. In one of his books, *Impressions and Experiences*, he recounts his experiences of this apprenticeship in a very charming essay. He presents his impressions of his sojourn in Venice, during his consulship in 1861-1865, in a book entitled *Venetian Life*. His subsequent residence in New York City as writer for the *Tribune* and the *Nation* prepared him still further for his career as a novelist. In 1871 he became assistant editor of the *Atlantic Monthly*, and in 1886 joined the staff of *Harper's Magazine*. To the latter periodical, Howells for years contributed charming informal comments on literary and other topics of the day, under the caption "The Editor's Easy Chair."

**Personal Characteristics.** A charming quality of this great man was his capacity for friendship. In a book entitled *Literary Friends and Acquaintances*, Howells has treated of fifty persons who were his friends of varying degrees of intimacy. Among the subjects of these sketches we find such well-known persons as Bret Harte, Lowell, Holmes, Longfellow, Hawthorne, Henry James, and Walt Whitman. In the entire book there is not a sarcastic or ill-natured word, but it is characterized by a kindness and affection which are almost courtly in their homage.

Mark Twain once said in an essay that other men, including himself, sometimes found the right word; Howells always found it. He was the particular friend of Howells, who in turn had for the great humorist an unbounded admiration.

It is only in these writings about his friends that Howells does not remain the severe realist. While recognizing their shortcomings, he is inclined to temper and qualify his characterization in a generous effort at idealization. No finer example of his faithfulness to his friends could be given.

**His Style.** Howells was a highly composed and dignified writer, but he possessed a touch of whimsicality which sometimes broke through the sedateness. One instance of this is his aptness at word-making. Here are a few specimens of his invention: *tableclothy*, *beenabroads*, *songy*, *onliest*, *laughability*, *umbrellaed*, *hatiness*, and *cloakiness*. These coinages are only occa-



Photo: Brown Bros.

WILLIAM DEAN HOWELLS

sional, but they are noticeable in a writer who is generally fastidious and conservative.

He was an expert in the use of grammar, but avoided the extreme of the pedant and the precisian. He had a certain liberality toward questions of usage, which was vexatious to the scholar, but never objectionable to the truly educated person.

In general, his writing was serene and clear, and often it blossomed into beauty. Although a realist, his taste was instinctively for the fine in preference to the crude, and his honesty of expression never transcended the bounds of refinement.

**Summary of His Work.** His first novel, *Their Wedding Journey*, is a story of two very human lives. It was followed by a long succession of novels. His *Rise of Silas Lapham* is a broadly American novel, fraught with kindly human sympathy. His *Hazard of New Fortunes* is a story of the dramatic unrest of current conditions in a big city. Among other important novels are *A Modern Instance*, *A Foregone Conclusion*, *The World of Chance*, *Story of a Play*, *Ragged Lady*, and *The Kentons*. *Years of My Youth* and *Middle Years of My Life* are in biographical vein. His farces include *The Elevator*, *The Sleeping Car*, *The Mouse Trap*, and *The Register*. After his death, his publishers produced *The Vacation of the Kelwyns* and *Mrs. Farrell*.

E.U.G.

**HOWITZER**, *hou' it zur*, a form of cannon designed to throw a shell at a high angle, so that its fire reaches soldiers protected from horizontal shots by fortifications and entrenchments. Howitzers are intermediate between guns and mortars, being longer in proportion to their caliber than the mortar, and shorter than the gun. During the World War, the great destructive power of huge siege howitzers was appalling. The projectiles from the most powerful of these monsters plowed their way through the thickest concrete walls and dug great holes in the earth below. The shells used against fortifications are filled with high explosives, while those used in searching out trenches carry shrapnel. See ARTILLERY, for illustration.

**HOWLERS**, a group of American monkeys which utter sounds probably as hideous as ever were heard in a forest or "zoo." These monkeys live chiefly in the tropical forests of Brazil, Venezuela, and Mexico, and are of large size, with human-looking, rounded heads, projecting muzzle, and face surrounded by a fringe of hair. The fur is red-brown, brown, or black, and the long tail is adapted for holding or grasping. The extraordinary voice of the howlers, which makes the woods echo with most unpleasant sounds at early morning and at evening, is due to the inflation of a bone in the throat into a hollow drum, which communicates with the larynx. Howlers feed on fruit and leaves. They are the largest monkeys of the western hemisphere and among the lowest in intelligence. See MONKEY. M.J.H.

**HOWRAH**, a suburb of Calcutta (which see).

**HOYLE, EDMOND** (1672-1769), a writer on games, especially whist. Not much is known about his life, although it has been stated that he was educated for the bar and lived in London, England, while writing on games and giving lessons in whist. His *Short Treatise on Whist* was published in 1742 and attained a thirteenth edition in 1763. The current expression "according to Hoyle" indicates the reputation he acquired as an authority on games.

**HROLF.** See NORMANDY.

**HUASCAR, wahs kahr'.** See ATAHUALPA; PIZARRO, FRANCISCO.

**HUAYNA CAPAC, wah' e nah kah' pahk.** See INCA.

**HUBBARD, ELBERT** (1850-1915), a pictur-esque figure in modern American letters, who won success as an advertisement writer, lecturer, publisher, editor, and essayist, but who became most widely known as the founder of the "Roycroft Shop" in East Aurora, N. Y., an establishment where artistic books are produced and various handicrafts are practiced. "Fra Elbertus," as he was accustomed to style himself, was born in Bloomington, Ill., and educated in the common schools. He attracted wide attention as the publisher of two magazines: *The Philistine*, devoted to philosophy and criticism frankly and unconventionally expressed, and *The Fra*, an open forum for the courageous discussion of all sorts of subjects, expressed in his forceful, epigrammatic style. Hubbard's varied and interesting career came to an end in May, 1915, when he lost his life through the sinking of the steamship *Lusitania*. See ARTS AND CRAFTS.

**His Writings.** Among his best-known writings are a notable series of *Little Journeys* that take the reader to the homes of authors, musicians, artists, and philosophers, for which, however, the author disclaimed entire historical accuracy. His most widely read essay is *A Message to Garcia*, a stirring account of a bold exploit connected with the Spanish-American War (see GARCIA Y INIGUEZ); this is included in a volume containing, among other essays, *The Cigarette, Get Out or Get in Line*, and *Pasteboard Proclivities*.

**HUBERTSBURG, TREATY OF.** See FREDERICK (II, Prussia).

**HUCK, OR HUCKABACK**, toweling of linen or cotton having a small design, and a rough surface with loosely spun filling yarns, to absorb moisture. Most of such fabrics have

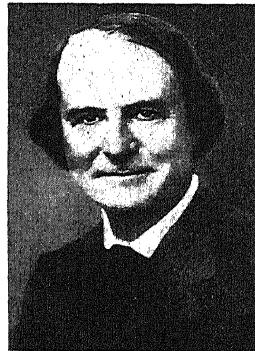
warp and filling of different fibers, cotton warp and linen filling being known as "union huck."

**HUCKLEBERRY, OR WHORTLEBERRY,** *huk'le bér'ie*, a shrub belonging to the heath family, of which several species are known. The common swamp huckleberry

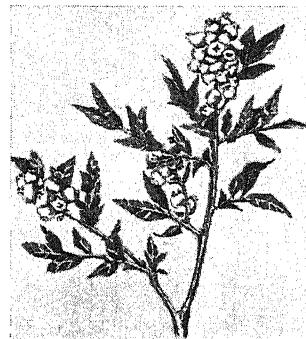
bears slender, spreading stems, sometimes ten feet or more in height, white, bell-shaped flowers, and small oval or wedge-shaped leaves. Sweet, juicy berries, blue-black in color and containing a few small seeds, constitute the fruit of this species of huckleberry. Another familiar species, the low-bush huckleberry, grows to a height of from one to three feet on low or rocky ground. Huckleberries are found from New England to the Rocky Mountains and in all but the extreme Southern states.

**The Blueberry.** Several species of blueberries are popularly known as huckleberries in many localities, but there is a botanical distinction between the two fruits. In eating blueberries, one is not aware of the large number of very tiny seeds contained in them, while the few, hard seeds in huckleberries are easily felt between the teeth. The blueberry is common in Great Britain, in Europe, and throughout North America. There are two main divisions, the high-bush and the low-bush, the former varying in size from five to ten feet, and the latter, from six inches to three feet. Different species bear fruit of various colors—black, blue, white, and red.

The market blueberries of the United States and Canada are the fruit of a shrub that grows on dry, sandy hills from New Jersey northward, and in the northern tier of counties in Minnesota and the adjoining Canadian provinces. Nearly all of the product used by the people in the central part of the United States is obtained from the Minnesota tracts. In Maine there is a great field of 150,000 acres, known as the "blueberry barrens," from which about 720,000 cans of berries are obtained each year. The berries are picked by hand. Occasionally, a tract of land is burned over to clear the ground for new bushes, and during the season before the burning, the berries are often gathered with a berry rake. This implement is similar to a deep dustpan with a bottom

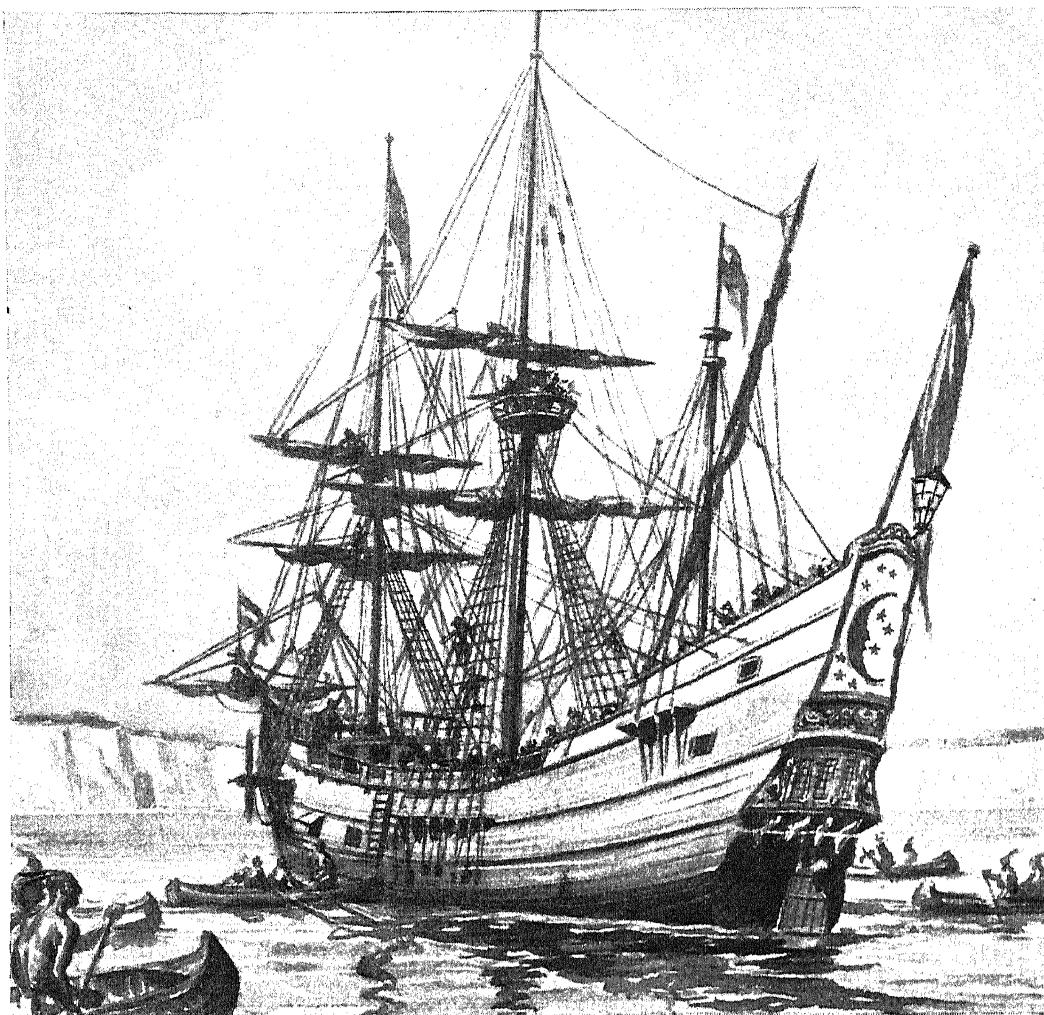


ELBERT HUBBARD



THE HUCKLEBERRY

A branch, showing how the berries grow.



THE "HALF MOON" IN THE HUDSON RIVER, AS PICTURED BY THE ARTIST

containing teeth like those of a comb, and can only be used when injury to the bushes does not have to be considered.

Uncooked blueberries are served as a dessert, and the fruit is also used in making pies and other pastry, preserves, jellies, and wine. B.M.D.

**Classification.** These berries all belong to the family *Ericaceae*. Botanists place huckleberries in the genus *Gaylussacia*, and blueberries in *Vaccinium*.

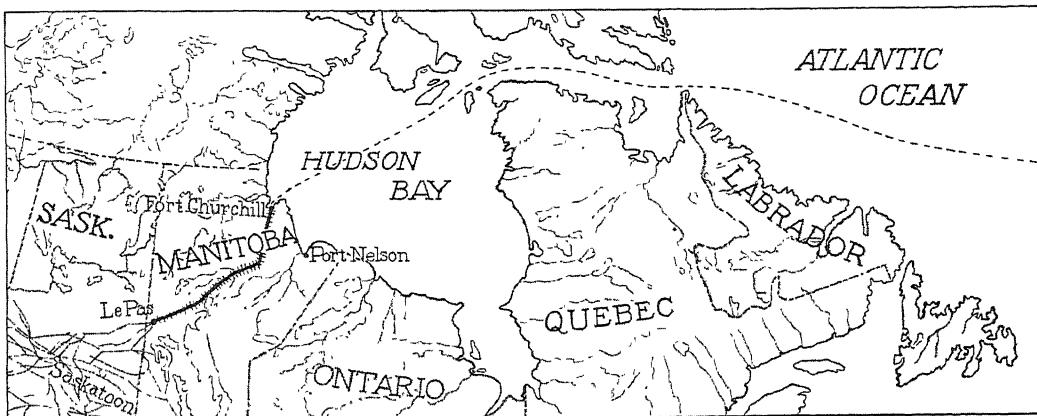
**HUDSON, HENRY** (? - 1611), a British explorer whose great work, entitling him to lasting recognition, was accomplished under the Dutch flag. He explored the river, bay, and strait named for him. In 1607 he sailed from London in a ship manned by ten men and a boy, to discover the Northeast Passage, and cruised beyond the eightieth degree of latitude. This, as well as two later voyages on the same mission, was unsuccessful. He then sailed, in

1609, for North America in a little vessel called the *Half Moon*, in the employ of the Dutch East India Company, and explored the Hudson River. A year later, he embarked in the *Discovery*, in search of a northwest passage to Asia. On this trip he discovered Hudson Strait and Hudson Bay. There the crew suffered many hardships during the winter, and finally mutinied; Hudson and his son were set adrift in a boat with seven loyal sailors, and never heard from



Photo: Brown Bros.

HENRY HUDSON



HUDSON BAY AND ITS RAILROAD

again. In 1909 the three-hundredth anniversary of the discovery of the Hudson River was celebrated in New York City. See NORTHWEST PASSAGE; NEW YORK (State).

**HUDSON, JEFFERY**, a famous dwarf. See DWARF.

**HUDSON, N. Y.** See NEW YORK (back of map).

**HUDSON, WILLIAM HENRY** (1851-1922), a British author and naturalist, born of English parents in South America amidst the scenes he was later to depict graphically in novels and nature treatises. He studied under such tutors as were available in that new country, but much of his knowledge he gleaned at first hand. As a child in a solitary land, he delighted in nature and studied bird and insect life with intense interest while roaming over the country; the story of his early life on the Argentine plains is told in his *Far Away and Long Ago*. From the time he was fifteen, his life was a struggle against ill health and poverty, which, with the death of his mother, whom he worshiped, deepened his loneliness and his love for nature and seclusion.

His excursions throughout South America, and his observations of bird life in England, which he first visited in the '80's, furnish the material for his voluminous works. His contribution of original and scientific knowledge brought him a civil pension in 1901.

**Characteristic Works.** Best known of Hudson's novels is *Green Mansions*, vivid with delightful description, and breathing a freshness that comes from only the earth itself. These characteristics mark all of Hudson's works, including *The Purple Land*, *Idle Days in Patagonia*, *The Naturalist in La Plata*, *Birds in Town and Village*, *A Crystal Age*, *The Land's End, Afoot in England*, *A Shepherd's Life*, *Adventures Among Birds*, *A Hind in Richmond Park*, and *Dead Man's Pluck*, written in 1921.

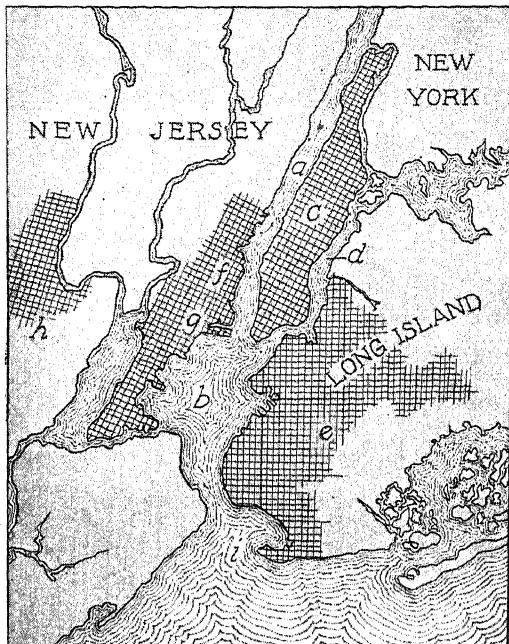
**HUDSON BAY**, formerly **HUDSON'S BAY**, is Canada's great land-locked sea. It forms, with its southern arm, called James Bay, a body of

water 900 miles long and 500 miles wide, and has an estimated area of 443,750 square miles, over four times that of all the Great Lakes. It may be regarded as an arm of both the Atlantic and the Arctic oceans, for it communicates with the former through Hudson Strait and with the latter through Fox Channel and various other passages. In the past, Hudson Bay has been known principally as the last discovery, in 1610, of the great Dutch navigator whose name it bears, and as the starting point of the fur-trading activities of the Hudson's Bay Company. Now its shores are being brought into contact with civilization by the building of railroads, and its waters are becoming a great highway for ocean steamships.

Navigation in Hudson Bay, however, is subject to inconveniences and even dangers. For more than half the year, ice entirely prevents navigation, and there is further difficulty in that the nearness of the north magnetic pole makes mariners' compasses unreliable. Even from the earliest days, however, sailing ships have made their way in and out of the bay, and now their old routes are being taken by great steamships. The shores of the bay are not inviting to settlers, and are not likely to be productive. On the west they are low and level; on the east they rise in rocky bluffs. Minerals are known to exist both east and west of the bay, and there is some timber, but most of it is too small to be commercially valuable. James Bay (which see) is in the same latitude as the cities of the Canadian prairies, and the lands south and west of it are thought to be suitable for dairy farming. About thirty rivers empty into Hudson Bay, the most important, the Nelson and the Churchill (both of which see), forming excellent harbors at their mouths.

**The Hudson Bay Railway.** The fact that through Hudson Bay the Atlantic penetrates far into the Canadian Middle West, and that Port Nelson and Churchill are a thousand miles

closer to the grain-growing and cattle-raising prairies of the west than Montreal, has led the Canadian government to begin a railroad to the bay from The Pass (Le Pas), Manitoba, where connection is made with the Canadian National Railways. Its terminus on the Bay will be at Churchill. Hudson Bay itself is



AT THE MOUTH OF THE HUDSON

Reference (a) indicates the lower twenty miles of the course of the river; (b) is Upper New York Bay; (c) the island of Manhattan, once the entire territory of New York City; (d) East River; (e) Brooklyn, now a part of the greater city; (f) Hoboken, the terminus of most of the Atlantic passenger steamers; (g) Jersey City; (h) Newark; (i) Lower New York Bay.

never frozen, but, except from three to five months of the summer, ice blocks Hudson Strait and closes the bay. Nevertheless, it is believed that the grain and cattle shipped to Europe in these few months when navigation is open will render profitable the 424 miles of railway. The last hundred miles of the road, from Kettle Rapids to Fort Churchill, were completed late in 1929.

Other railroads to Hudson Bay are planned, among them the extension of the Temiskaming & Northern Ontario (the Ontario government railway) from Cochrane to James Bay, a distance of about 150 miles. Provision has also been made to give the Ontario government a strip of land five miles wide through Manitoba to Churchill, so that the railway may eventually be continued to that point.

**HUDSON RIVER**, frequently called the "Rhine of America," is one of the most important rivers in the United States, because of its

beauty, historic interest, and commercial value. Though it is only 300 miles in length, and lies entirely within the state of New York, it has, at its mouth, New York City, the metropolis of the western hemisphere, and second largest city in the world.

In the wildest part of the Adirondacks, 4,322 feet above sea level, lies a little lake with the romantic name of Tear-of-the-Clouds, and in this the dashing mountain stream which is the Hudson in its earlier stages takes its rise. It flows almost straight south, keeping near the eastern boundary of New York state until it empties into the Atlantic at New York City. In its upper course, it is a small stream with a rapid fall, and numerous small cities on its banks make use of the water power. Emerging from the mountains, it flows through a region of no particular beauty until it enters the picturesque Highlands, about sixty miles below Albany. For sixteen miles its rather narrow valley winds between high and rocky shores of great beauty, and it is the fancied resemblance of these to the castled banks of the Rhine that has given the river its popular name. Farther on in its course—not much above the mouth—occur the Palisades, great perpendicular rock masses which constitute one of the chief natural beauties of the country.

One of the numerous streams flowing into the Hudson is the Mohawk, which empties into it just above Troy, and which carries a greater volume of water than the Hudson itself. From Troy downward to its mouth it is less a river than a drowned valley or fiord up which the tidal flow finds its way. This estuary is of sufficient size to permit large vessels to ascend to Albany, 144 miles from the mouth, while smaller boats easily reach Troy, six miles farther on. Traffic on the river is large, but all the vessels on its waters are by no means commercially employed, for few regions in the country are more visited by tourists than the Hudson, and luxurious day and night steamers have been built to accommodate them. At its mouth, along the western shore, across from Manhattan Island, are the docks of the leading trans-Atlantic passenger steamers.

Discovered by Verrazano in 1524, the river was first explored in 1609 by Henry Hudson, for whom it was named (see **HUDSON, HENRY**). Its excellent harbor determined the site of New York, and its shores saw some of the important conflicts of the Revolution. On its waters Robert Fulton launched the first successful steamboat, and along its valley one of the earliest railways on the continent was built. To-day, great railroads run parallel with it through much of its course. The valley of the Hudson is one of the most thickly settled parts of the country; along it are to be found many thriving cities and villages. Excellent



HUDSON RIVER, AT WEST POINT

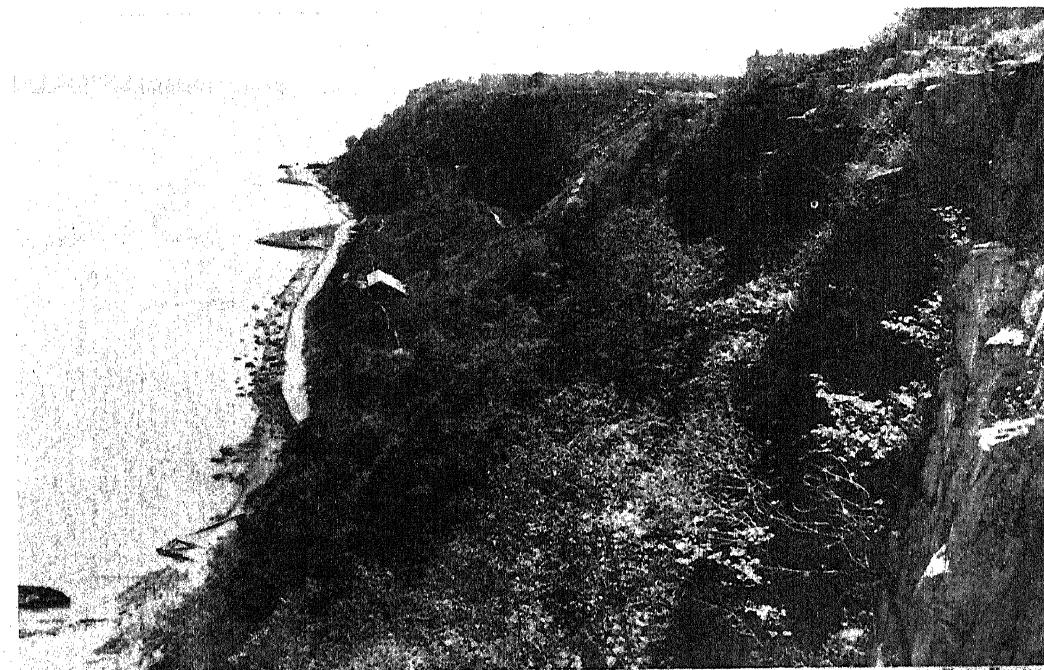


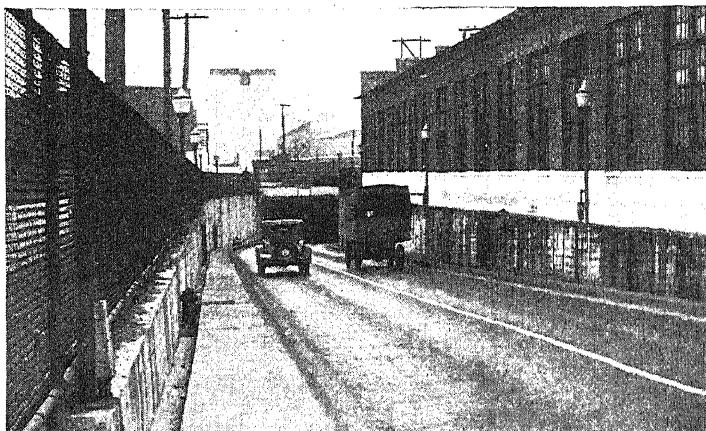
Photo: Keystone

THE PICTURESQUE PALISADES

Photographed from a point looking down from Fort Lee, N. J.

motor roads follow its shores from Albany to New York, and are favorite highways in the tourist season. See NEW YORK (Physical Features).

**HUDSON RIVER TUNNELS.** At the commencement of the twentieth century, Manhattan Island, now the business heart of New York City, was almost as completely isolated from the surrounding mainland as when the Dutch bought it from the Indians nearly three hundred years earlier. There were bridges across the narrow Harlem River at the north, and the

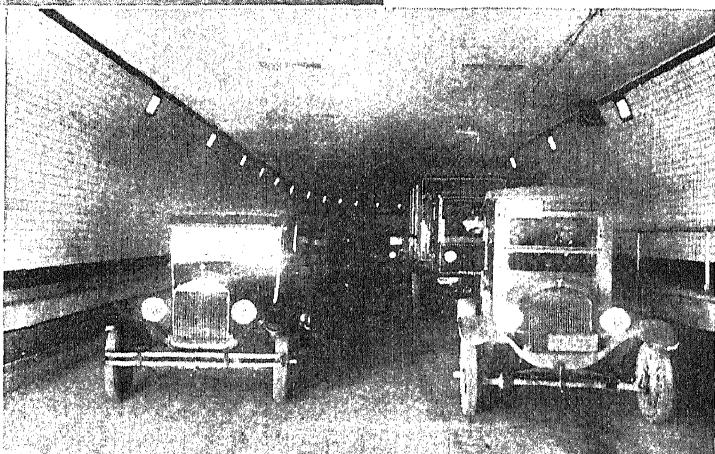


great Brooklyn Bridge to Long Island on the east, but to reach the New Jersey shore on the west it was necessary to cross a mile of water by boat. Thousands of people whose daily work was in New York, and the hundreds of thousands who came to the city each year from the south and west, were dependent on ferry boats for their passage over the river. On foggy days and in the winter, when floating ice-cakes obstructed the passage, there were many delays.

In 1874 an unsuccessful attempt was made to tunnel under the river. Even the much shorter East River had no passage beneath it but a gas tunnel ten feet in diameter, completed in 1894. But in 1902 a young lawyer, who had come from Tennessee only ten years before, became president of the Hudson & Manhattan Railroad Company, a company which acquired the rights to the abandoned tunnel. Through the activity of this young man, William G. McAdoo (which see), a sum amounting to \$70,000,000 was obtained for a renewal of the undertaking.

Franchises were secured in both New York and New Jersey, and two pairs of tunnels were driven under the Hudson River, about a mile apart. The financial ability which Mr. McAdoo displayed led later to his appointment as Secretary of the Treasury under President Wilson.

There are now four pairs of tunnels to New Jersey, and besides the gas tunnel, there are seven sets of tunnels to Long Island, some double and some single. The Hudson and Manhattan Railway system now consists of a network of connecting tunnels and subways, the north tunnels, the uptown tunnels, the south tunnels, and two single-track tubes. The north tunnels, the first to be completed in 1904 and put in railroad operation in 1908, connect Jersey City with Morton Street, Manhattan. The inside diameter of each of its tubes is fifteen feet three inches; the length of the tube is approximately one mile. From the New York end, a subway runs north to the Pennsylvania



Photos: U & U

THE HUDSON VEHICULAR TUNNEL  
Above, the approach on the New Jersey side, at Fourteenth Street, Jersey City. Below, a view under the river.

Railroad Station. The uptown tunnels connect with the north tunnels at Morton Street and extend to Sixth Avenue and Thirty-third Street, Manhattan. The south tunnels consist of two tubes which extend from Jersey City to Cortlandt, Church, and Fulton streets in New York. These two single-track tubes extend from the Hoboken terminal of the Lackawanna Railroad to Jersey City, with connections to the north and south tunnels and the Pennsyl-

vania Station, New York. From the junction of the two tunnels, a line partly a subway and partly above ground extends about ten miles west into Newark.

The Pennsylvania Railroad operates two tubes under the Hudson River and four under the East River. The two Hudson River tunnels completed in 1910 cross Manhattan and continue on under the East River to Long Island.

A double vehicular tunnel under the Hudson was begun in 1922, completed in 1926, and opened to traffic in 1927. Each of the tubes is twenty-nine feet six inches in height, and approximately 9,500 feet in length. Each tunnel accommodates a double line of one-way traffic and a three-foot sidewalk for pedestrians. See NEW YORK (City).

[Illustrations of the Hudson Vehicular Tunnel construction are presented in the article TUNNEL.]

**HUDSON'S BAY COMPANY.** This joint-stock association for trading in British North America was a strong factor in developing Canadian civilization, and played a large part in the romance and adventure of early days in that vast region. The gloomy woods and the streams and lakes, with their infinite variety of fur-bearing animals; the Indian guides and fur-hunters; the canoes floating downstream for miles and miles past forests untrodden by white men—all these form part of the picture called up by the name of the Hudson's Bay Company.

The French were the first to discover that North America was a rich fur territory, and it was two French traders, stranded in London, who suggested to Charles II and his court that fortunes could be made in the fur trade. Hudson Bay territory was claimed by the English by right of discovery; so, in 1670, a company of "Adventurers of England trading into Hudson's Bay" was formed. To the company was granted the "sole trade and commerce" of all those lands drained by streams flowing into Hudson Bay. Forts were established in the coast regions, and trade and barter with the Indians was begun. The Indians, with their love of brightness and color, were glad to exchange the beautiful, soft pelts for beads or printed cloth. In England the company became enormously wealthy, and Englishmen boasted of the price of their beaver mittens or milady's fox furs, unmindful of the fact that in the great wilderness men were enduring long, silent winters and the loneliness of the frozen forests to secure those furs.

The company's officials, however, had to contend with enemies. Parliament threatened to withdraw their charter because they had made no attempt to found settlements in the interior, as was agreed. The French in Canada had no liking for a rival, and their men often

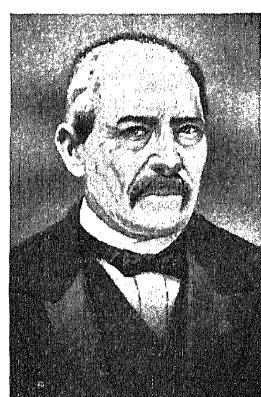
looted the English forts, once sailing out with their spoil in the face of the English fleet. Nor were matters bettered when, in 1763, Canada was surrendered to the English. Minor fur-trading companies sprang up, and these, combining as the North-West Company, proved a serious rival to the original association. Endeavoring to outstrip the Hudson's Bay men, the "Nor'westers" bribed the Indians with rum, and soon the forests looked down on drunken Indians—a sight which never before had been witnessed—and on drunken white men as well, for not all the fire water was given away.

In their quest for furs, the Nor'westers and the Hudson's Bay men opened up the Canadian territory to the shores of the Pacific during years of strife and rivalry whose story is as thrilling as any romance ever written. Finally, the two companies joined forces in 1821. Seventeen years later, the Hudson's Bay Company succeeded in acquiring the sole right again, but their grant expired in 1859. From that time on, all traders had equal privileges. The Hudson's Bay Company did not disband, nor did it give up its original territorial rights until 1869, when it received from the British government about \$1,500,000 for them. It is still a prosperous trading company, which not only carries goods into the wilderness for sale, but operates large city department stores. See FUR AND FUR TRADE; BRITISH COLUMBIA (Under the Rule of the Hudson's Bay Company).

**HUÉ, oo a'.** See FRENCH INDO-CHINA (Anam).

**HUERTA, hwair' tah, VICTORIANO** (1844-1916), a Mexican soldier and politician, the leading figure in the revolution which deposed President Madero in 1913. Huerta was a descendant of the Indian and Spanish races of Mexico, and was born of obscure parents. A military leader, noting the boy's ability and intelligence and his expressed desire to become a general, placed him in the National Military School at Chapultepec. For thirty years after his graduation, he served in the army under President Porfirio Diaz, who raised him to the rank of brigadier general.

Diaz, for good reasons, distrusted his able general, but it was Huerta, then Minister of War, who saw that the deposed President,



VICTORIANO HUERTA

when exiled in 1911, had safe-conduct when he fled from the capital. During the administration of Madero, the successor of Diaz, Huerta was placed in command of the government troops to suppress the insurrection of Felix Diaz, but he soon deserted the President and headed the counter-revolution which forced the latter's resignation. He himself became provisional President; five days later, Madero was murdered, presumably by Huerta's order. The new government set up by Huerta and founded on violence, was denied recognition by the United States.

For over a year he maintained his authority, in spite of the opposition of the United States and of the Constitutionalists under Carranza. In April, 1914, the American flag was insulted at Tampico, an episode which all but involved the two countries in war, and led the United States to occupy Vera Cruz. Meanwhile, the Constitutionalists were making such headway that rumors of Huerta's resignation were soon current. On July 15, 1914, he gave up his office and fled to Europe, where he remained until the following spring. He then bought a small farm on Long Island, near New York City, but after a few months started west, under the pretense that he wished to visit the exposition at San Francisco. His real object was declared to be to start a new revolt, and on July 3, 1915, he was arrested at El Paso, Tex., for violating the neutrality of the United States. After spending six months in a detention station, he died. See MEXICO (History: Civil War); VILLA, FRANCISCO; CARRANZA.

**HUGH CAPET**, *ku' pēt* (939-996), Duke of Francia and king of France from 987 to 996, was the first of the Capetian Dynasty (which see). Not until he was chosen king by the nobles as successor to Louis V, the last king of the Carolingian line, could it be said that France had a French king. His royal dominions, however, were only one-twentieth part of the country that is now France. The House of Capet has given 118 sovereigns to Europe, which include thirty-six to France, twenty-two to Portugal, eleven to Naples and Sicily, and five to Spain. See CAROLINGIANS.

**HUGHES**, *huze*, CHARLES EVANS (1862- ), an American jurist and statesman, governor of New York, Associate Justice of the Supreme Court, Secretary of State, member of the World Court, then again, in 1930, appointed to the Supreme Court as Chief Justice. Hughes bears the distinction of being the only man who ever returned to the Supreme Court after once having resigned from it. In 1916 he was barely defeated for the Presidency by Woodrow Wilson. He was born at Glens Falls, N. Y., and was educated at Colgate and at Brown universities, and at the Columbia Law School. His law practice began in New York City in 1884.

Hughes was brought prominently into public life in 1905, when he was appointed special attorney by the New York legislature to investigate the financial methods of the powerful life-insurance companies of the state. The thoroughness with which he performed his task resulted in an awakening of public opinion and in far-reaching reforms, and led in 1906 to his election as governor of New York on the Re-

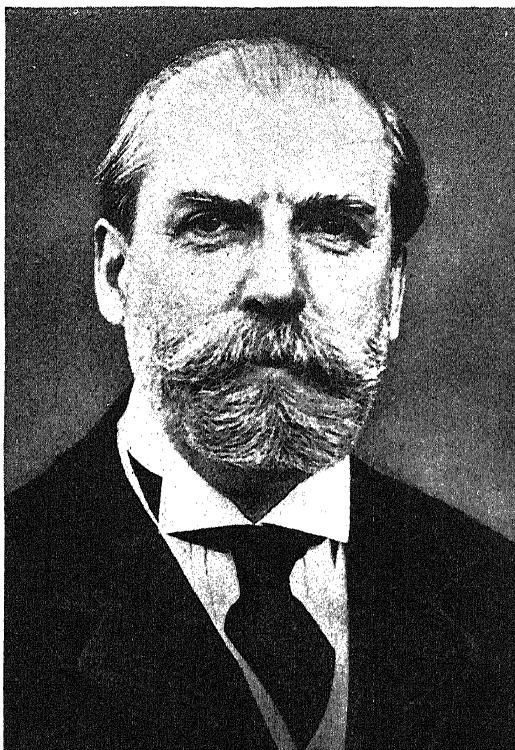


Photo: Brown Bros.

CHARLES EVANS HUGHES

publican ticket; he defeated his chief opponent, William Randolph Hearst, by 60,000 votes. Two years later he was reelected. During his terms as governor, Hughes was engaged in a ceaseless fight for reform. Through his efforts a Public Service Commission Act was passed, and the race tracks of the state were closed. The struggle for direct primaries, begun by him, was long and bitter, but a law providing for that reform was passed in 1913.

Before the end of his second term, President Taft appointed him an Associate Justice of the Supreme Court of the United States, and he resigned the governorship in the autumn of 1910. Because of his determination to serve his country well as a member of the Supreme Court and to remain aloof from the rancors of partisan politics, Justice Hughes consistently refused to take any part in the contest for the Presidential nomination in 1916. Without encouragement from him, he was named as his

party's standard bearer. In the November election, Woodrow Wilson (which see) defeated him by a narrow margin. In 1921 Hughes became Secretary of State in the Cabinet of President Harding, and was continued in that post under President Coolidge until 1925 (see articles on these Presidents), when he resigned, to reenter private law practice.

His commanding talents were again used in the interest of his country when, as chairman of the American delegation at the Pan-American Conference of 1928, which met in Havana, Cuba, he contributed much to the success of the meeting by his tact and his straightforward presentation of American ideals. The same year, Hughes was chosen to fill the unexpired term of John Bassett Moore in the World Court, Moore having resigned his membership. In 1929 Hughes took up his work in connection with the Court, but resigned in 1930 to become Chief Justice of the Supreme Court. See PERMANENT COURT OF INTERNATIONAL JUSTICE; SUPREME COURT.

**HUGHES, RUPERT** (1872- ), an American author, best known for his fiction, of which he has produced many volumes. He was born in Lancaster, Me., and his education was completed at Yale University in 1899. He gained literary experience as assistant editor of *Godey's Magazine*, *Current Literature*, and *The Criterion*. Military experience came to him in service, from private to captain, in the New York National Guard, as assistant to the New York adjutant general, as captain on the Mexican border in 1916, and later as major; his discharge was granted in 1919, when he became major in the Reserve Corps.

**Literary Output.** The non-fiction of Hughes includes *American Composers*, *Love Affairs of Great Musicians*, *Music Lovers' Cyclopedia*, and *George Washington*. As a dramatist he is best known for the comedy *Excuse Me* and his dramatization of *Tess of the Storm Country*. The motion-picture field claimed a share of his time, and for the films he produced, among others, *Scratch My Back*, *The Old Nest*, *Dangerous Curve Ahead*, *Genuine*, *Souls for Sale*, *Remembrance*, *The Old Home Town*, and *The Patent Leather Kid*. His novels include *The Thirteenth Commandment*, *We Can't Have Everything*, *Cup of Fury*, *Within These Walls*, *The Golden Ladder*, *Destiny*, and *Mermaid and Centaur*.

**HUGHES, THOMAS** (1823-1895), an English author who portrayed incidents of the daily life of the typical English schoolboy with a sympathy and insight that make his stories a revelation of boy nature. The book which won him distinction was *Tom Brown's School Days*, published in 1856. The bulk of his literary work is insignificant when compared with this one celebrated book. Hughes was only ten years of age when he was sent to the famous school at Rugby, of which Dr. Arnold was head master, and *Tom Brown* is a product of

his personal impressions (see RUGBY SCHOOL; ARNOLD, THOMAS). He enjoyed a long public career, as an advanced Liberal in Parliament and as one of the founders of the Christian Socialists, and he devoted a great deal of time to the social uplift of the working class, particularly through the system of co-operation.

**Other Writings.** *Vacation Rambles* is a collection of sketches which he wrote to defray his expenses on little Continental trips, and these sketches served as his apprenticeship in writing. *The Scouring of the White Horse* is a lively account of one of his vacation trips. He continued his favorite hero's career in *Tom Brown at Oxford*, which was first published as a serial in *Macmillan's Magazine*. His other works include *The Memoir of a Brother*, *The Manliness of Christ*, *Alfred the Great*, and a sketch of the socialistic settlement at Rugby, Tenn.

#### HUGH TOWN. See SCILLY ISLANDS.

**HUGLI, OR HOOGHLY**, *hoo' glie*, RIVER, the principal delta channel through which the Ganges reaches the sea, formed by the union of three small rivers. Including its estuary, the Hugli is about 160 miles long. Commercially, this is the most important of the numerous delta outlets, for it is the one most easily navigated. Large boats can ascend to Calcutta, eighty-six miles from the sea. See GANGES RIVER.

**HUGO, VICTOR MARIE** (1802-1885), a French poet, novelist, and dramatist, one of the commanding figures in the world of literature. As a writer of fiction, he is best known as the author of that great epic of the human soul, *Les Misérables*. Those who look for perfection of construction, proportion, and symmetry in a novel will find none of these qualities in *Les Misérables*. This story of Jean Valjean, a man raised from the depths of sin and degradation, purified and transfigured by suffering, is a masterpiece of emotional and descriptive writing, a lyric epic in prose. When it was published, in 1862, it appeared on the same day in ten different languages, and it still is widely read.

Victor Hugo was born at Besançon, on February 26, 1802, the son of a distinguished general who served in the army of Napoleon Bonaparte. The boy was educated in Madrid and in Paris, and he grew up passionately devoted to the principles of the royalists and in the Roman Catholic faith. His poetic genius was revealed in his early odes and bal-



Photo: Brown Bros.

THOMAS HUGHES

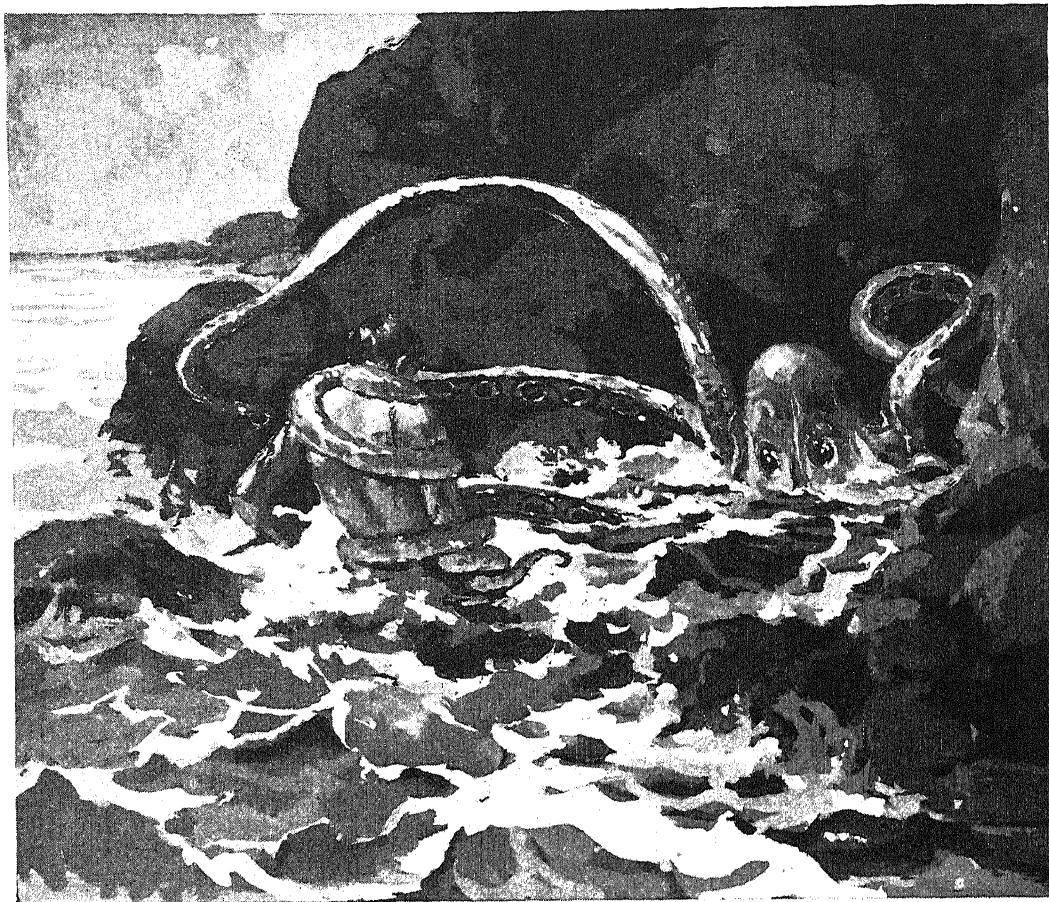


ILLUSTRATION FROM HUGO'S "TOILERS OF THE SEA"

Gilliat, hero of the book, kills an octopus in a water battle staged in a rocky grotto.

lads, published before he was twenty-five, and when, in 1830, his tragedy *Hernani* was produced in Paris, he was hailed as the great leader of the Romanticists (see ROMANTICISM). This was followed by several other plays, notably *Marion Delorme*, *The King Amuses Himself*, *Lucrece Borgia*, *Ruy Blas*, and *Les Burgraves*; but with the presentation of the latter, in 1843, Hugo became convinced that his conceptions of the drama were too lofty for the limitations of the stage, and he abandoned his dramatic career.

In 1829 he gave to the press his first important work in prose fiction, *The Last Day of a Man Condemned to Death*, a fervent protest against capital punishment. *Notre-Dame de Paris*, a great historic romance in the form of a prose narrative, with its wonderful picture of Paris in the time of Louis XI, followed in 1831. Three years later appeared the novel *Claude Gueux*, another eloquent plea against capital punishment, and then came several volumes of poems, revealing the author's growing sympathy for democratic ideals. In the

year 1841 he was elected to the French Academy.

The decade between 1843 and 1853 was a period of political activity for Hugo. In 1845 he was made a peer of France by Louis Philippe, and the following year delivered his first speech in the House of Lords, or upper chamber of the French Parliament. On the outbreak of the Revolution of 1848, he gave his support to Louis Napoleon (later Napoleon III). When the latter ceased to favor his advancement, he became one of the leaders of the democratic faction, and after Napoleon's seizure of power, in 1851, Hugo was one of those who continued the struggle against that tyrant. Forced to flee from France, he went to Brussels and then to the island of Jersey, in the English Channel. From this retreat he was expelled with other French exiles by the English government in 1855, and finally settled on the island of Guernsey, where he remained until 1870.

In his *Napoleon the Little* and *History of a Crime*, written in the first year of his exile, Hugo gave vent to his indignation over the

manner in which the Second Empire under Napoleon III was founded. During his sojourn in the Channel Islands, he wrote, among other works, the first part of his *Legend of the Centuries*, an epic which in nobility and beauty rivals Milton's *Paradise Lost* and Dante's *Divine Comedy*; it was here also that he wrote the matchless *Les Misérables* and two other novels splendid in imaginative power, *The Man Who Laughs* and *Toilers of the Sea*.

In 1870 France began its disastrous war with Germany (see FRANCO-GERMAN WAR), and the empire of Napoleon III was soon tottering to its fall. In the troubled days that followed, Hugo took his seat in the National Assembly, which met at Bordeaux in 1871. Resigning in March of that year, he went to Brussels, from which he was expelled because of his defense of the Paris Commune (see COMMUNE). Soon after he returned to Paris. In 1872 he published his *Terrible Year*, a volume of verse recording the downfall of the empire, so noble in spirit and so majestic in expression that it even glorified disaster. His last great romance, *Ninety-three*, an historic novel of the year 1793, appeared in 1874, but volumes of verse came from his pen until nearly the end of his life.

He died on May 22, 1885, and his funeral was a great public pageant as magnificent as was ever accorded a king. His body lies in Paris, in the Pantheon (which see). B.M.W.

[Under the title *Les Misérables*, the reader will find a detailed account of Hugo's masterpiece.]

**HUGUENOTS**, *hu' ge notz*, a term of doubtful origin, applied by the Roman Catholics to the Protestants of France during the religious struggles of the sixteenth and seventeenth centuries. The Huguenots drew their inspiration from Calvin, and were at first bitterly disliked by the court and the bulk of the people of France. Under Henry II, 1547-1559, the Protestant party grew strong, and persecution began. Under Francis II the Huguenots became a political force and included within their ranks Henry of Navarre, his brother Louis, the Prince of Condé, Admiral Coligny, and many others of high rank and great ability. At the head of the Roman Catholics stood the Guises, who employed their influence with the weak young king against the Protestants.

Upon the accession of Charles IX, the government was administered by the queen mother, Catharine de' Medici, who encouraged the Protestants in the free exercise of their religion, in order to curb the power of the Guises. But the bitter feelings of both parties plunged the country into the miseries of a civil war. Catharine, fearing then that Protestantism might become a permanent power in the country, suddenly made an alliance with the followers of the Duke of Guise, and together they carried out the dreadful Massacre of Saint Bartholomew's Day, August 24, 1572. In the reign of the feeble Henry III, the Huguenots, under the leadership of Henry of Navarre and the Prince of Condé, became very powerful; and the king and Catharine were compelled to make humiliating concessions which resulted in the

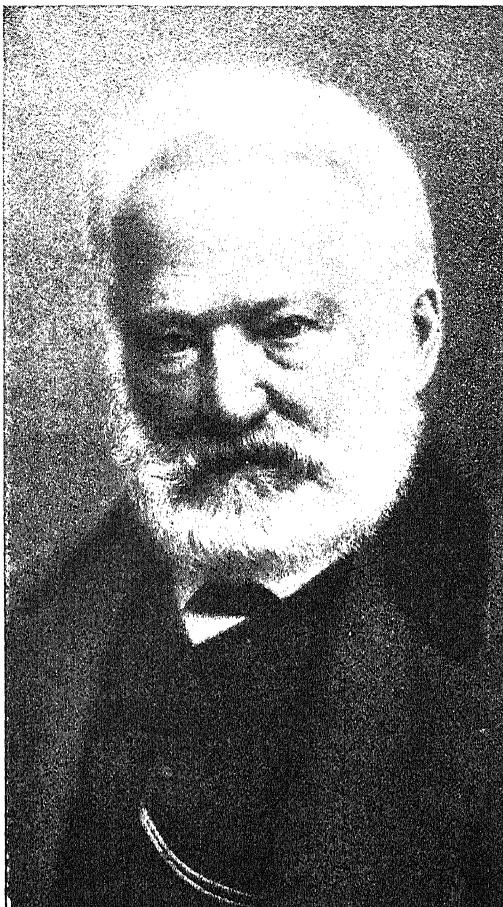


Photo: Brown Bros.

VICTOR HUGO

The greatest French novelist of his century. The sublimity and splendor of his imagination and his mastery of language rank him with Shakespeare, Milton, and Dante.

"War of the Three Henry's." Finding himself at the mercy of the Guises, Henry III caused the assassination of the Duke of Guise and the cardinal of Lorraine. This crime excited a violent outbreak, and to resist the opposition against him, the king allied himself with Henry of Navarre and the Huguenots.

After the assassination of Henry III, the king of Navarre assumed the throne. However, it was not until he had embraced the Roman Catholic faith, in 1593, on advice of his minister Sully, that he was able to enjoy quiet possession of his kingdom as Henry IV.

In 1598 he issued the famous Edict of Nantes, which conferred upon the Huguenots liberty of conscience and admission to all offices of honor and emolument. The Huguenots now formed a kind of republic within the kingdom, which Richelieu, who looked upon it as an obstacle to the growth of the royal power, determined to crush. Despite the assistance of Charles I of England, the Huguenots were compelled to yield to the forces of Richelieu, and Rochelle, as well as other Huguenot towns, surrendered.

Under the ministries of Richelieu and Mazarin, however, the Huguenots were still allowed freedom of conscience. Later, Louis XIV, through the influence of Madame de Maintenon, revoked the Edict of Nantes. This was followed by a terrible persecution, over 100,000 Huguenots being driven out, to carry their industry, wealth, and skill to other countries. Louis XV, at the instigation of the Jesuits, issued a new edict to repress Protestantism, but so strong had the spirit of toleration become that it was revoked. The French Revolution for the first time gave the Protestants in France equal civil and political rights with Roman Catholics, but the *recognized* Protestant Church was not permitted to hold synods or general assemblies until 1872. French Protestants now number approximately one million.

**Related Subjects.** The following articles in these volumes contain information which bears upon the Huguenots:

|                      |                           |
|----------------------|---------------------------|
| Catharine de' Medici | Henry (France)            |
| Charles (France)     | Nantes, Edict of          |
| Coligny, Gaspard de  | Reformation, The (France) |
| France (History)     | Saint Bartholomew's Day,  |
| Guise                | Massacre of               |

**HUGUENOTS, THE.** See OPERA (Some of the Famous Operas).

**HULL, ENGLAND.** See ENGLAND (The Cities).

**HULL, WILLIAM** (1753-1825), an American soldier whose surrender of Detroit to the British during the War of 1812 overshadowed a military career otherwise creditable. He was born in Derby, Conn., and educated at Yale College. In 1775, after completing law studies, he joined the colonial army as a captain, taking part in the leading Revolutionary battles, and rising to the rank of lieutenant colonel. After the war, he was elected to the Massachusetts state senate; in 1805 he became governor of the Territory of Michigan.

Hull was promoted to the rank of brigadier general early in 1812, and was given command of the army in the Northwest. Soon after the outbreak of the War of 1812, he invaded Canada, but accomplished nothing, and in August, having recrossed the border, he surrendered Detroit to General Brock, after a weak resistance. It has been charged that he showed such

great haste to surrender that, instead of waiting for a white flag of truce to be found, he seized a tablecloth and waved it over the walls of the fort. His act caused general indignation, and a court-martial, held in March, 1814, ordered him to be shot, a sentence later remitted by President Madison. See WAR OF 1812.

**HULL HOUSE.** In the heart of one of the foreign centers of Chicago is a social settlement known as Hull House, which was established by Miss Jane Addams and Miss Ellen Starr in 1889. It was one of the first of its kind in America, and has become the most famous of these enterprises. At the outset, the founders secured ample financial coöperation, and in this respect Hull House has been fortunate. It is under the active management of Miss Addams, who has been called the "first citizen of Illinois." She is assisted by educated and devoted resident workers. The buildings contain dormitories, a gymnasium with baths, a restaurant, boys' club rooms, working girls' club rooms, and a theater in which the people of the neighborhood give amateur plays.

For eight months of the year, beginning in October, instruction in industrial work makes Hull House a busy center of such activities as printing and bookbinding, sewing and cooking, wood-working, metal-working, and spinning and weaving. There are also classes in geography, literature, music, art, and other subjects, as the need for them is seen. Dancing, gymnasium work, and athletic sports offer wholesome recreation for young people, and good lectures and dramatic productions are given, of a kind to interest both young and old. During the summer months, the settlement aids in giving its people outings in the country. See ADDAMS, JANE.

L.L.B.

**Literary Reference.** Much of the interesting life in the institution is described in Miss Addams' book, *Twenty Years at Hull House*.

**HUMAN AGE.** See AGE, subhead.

**HUMAN EPOCH**, also called the RECENT and the HOLOCENE, the second epoch of the Quaternary Period, succeeding the Pleistocene Epoch and including the present time. The name Holocene is from the Greek and means

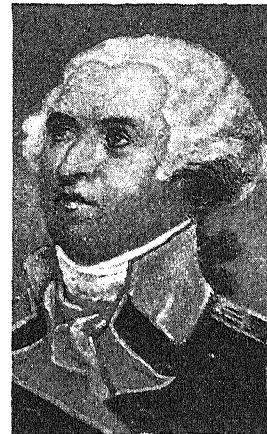
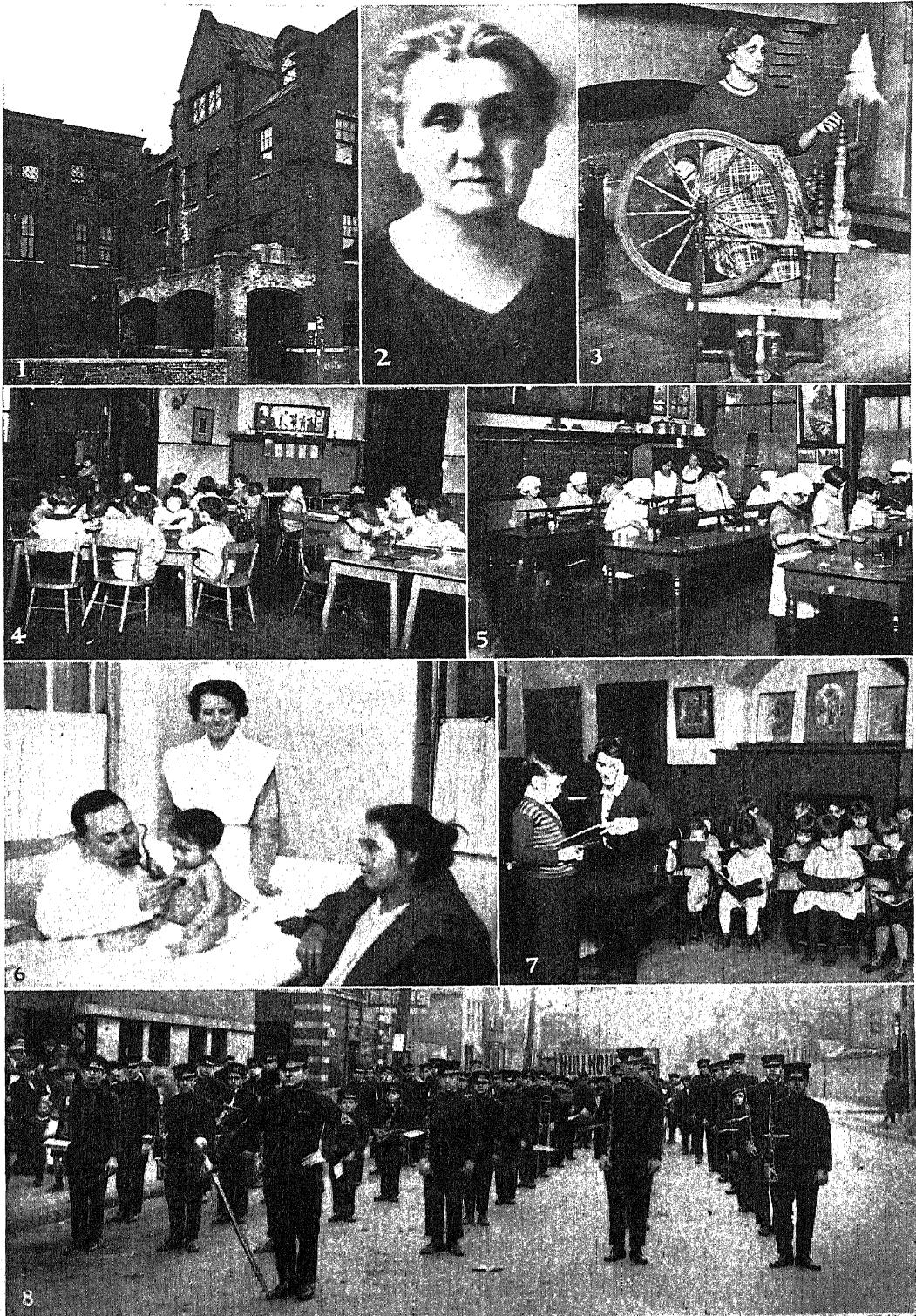


Photo: Brown Bros.

WILLIAM HULL

A colonel in the Revolutionary War, and Brigadier General in the War of 1812.



Photos: Kirkland

**Hull House, Its Founder, and Its Activities.** (1) A corner of the building. (2) Miss Jane Addams. (3) In the Labor Museum—an old spinning wheel. (4) Children's art class. (5) Cooking class. (6) Infant-welfare department. (7) Singing class. (8) Boys' band.

*wholly recent.* The division of the Quaternary Period into two epochs is an artificial one and is a survival from the time when it was erroneously supposed that conditions and processes in the geologic past were radically different from those of the present. Throughout most of the world, outside the regions invaded by the Pleistocene glaciers but now free from ice, geologic and geographic conditions of the present are nearly the same as in Pleistocene time. Great areas about both poles are still covered by continental glaciers, and, as far as geologic evidence goes, the Pleistocene Epoch has not yet ended.

Therefore, the choice of some particular time as the end of the Pleistocene and the beginning of the Recent Epoch must be made arbitrarily, if at all. For convenience, the Recent Epoch is customarily regarded as having begun when the ice sheets had entirely disappeared from Europe, which was, according to the best available data, from 9,000 to 12,000 years ago. As the most modern estimates of the length of the Pleistocene Epoch range from one million to two million years, the Recent Epoch is by comparison a mere episode.

Some forms of animal life that flourished in early Pleistocene time are now extinct, and the range of other forms has become greatly restricted. This change has been progressive, however, and was not associated with any particular stage of Quaternary time. In fact, several species of animals have become extinct during the Recent Epoch. The distinguishing features of the epoch, however, have been the spread of the human race over the entire habitable world, and, through the agency of man, the world-wide dispersion of domesticated varieties of animals and plants. In the development of agriculture, mining, manufacturing, and commerce, man has made use of natural resources, and in so doing has modified the earth's surface in a variety of ways.

Many persons are prone to think that geologic changes are no longer going on in the earth's crust, but such is not the case. They are still in progress, but many of them are so slow that the span of a human life is not long enough to detect them. The changes that are most readily observed are those on the surface of the earth, which consequently lie in the domain of the branch of geology known as physical geography.

L.L.A.F.

**Related Subjects.** The reader is referred in these volumes to the following articles:

Evolution  
Geology  
Glacial Epoch

Man  
Physical Geography  
Quaternary Period

**HUMANE, *hu mayn'*, SOCIETIES**, the popular name for organizations having for their purpose the prevention of cruelty to animals, the prevention of cruelty to children, and the protection of birds. The first organization for

the protection of animals was formed in England in 1824. In 1866 the first American society was formed in New York, through the influence of Henry Bergh (which see). Within the next few years, similar societies were formed in other states, and in 1875 the New York Society for the Prevention of Cruelty to Children was organized, also through the influence of Mr. Bergh. Within the next five years, similar societies were organized throughout the country. In 1877 a federation of the societies for the prevention of cruelty to animals and those for the prevention of cruelty to children was formed, under the name of the American Humane Association. This became a national organization, with its main purpose the kind treatment of animals transported long distances on railroads. Through the influence which this association brought to bear upon Congress, laws were enacted requiring better stock cars, and the unloading of stock in transit once in twenty-four hours for food, water, and rest.

The Royal Humane Society of England was founded in 1774, and had for its purpose the resuscitation of persons who were nearly drowned. The society is still in existence and has for its motto, "A small spark may perhaps lie hid." See CRUELTY TO ANIMALS, SOCIETY FOR THE PREVENTION OF CHILDREN, SOCIETIES FOR.

**HUMAN GROWTH, NEW KNOWLEDGE CONCERNING.** Within recent years, the idea has gained ground that, even though a child or young animal consumes an adequate amount of foodstuffs to supply in proper proportions the fundamental elements of nutrition, nevertheless these elements, especially minerals, cannot be assimilated unless there are activating or stimulating bodies in the organism which will cause the different organs to appropriate out of the food materials the elements needed for normal growth and activity. These activating bodies have been given the name of *vitamins*, suggesting that, while they are not themselves built into bone or tissue, they play a rôle in determining whether any food materials can be converted into bone or tissue.

Early in 1927, Professor Harry Steenbock (see subhead at end of this article) published the results of experiments concerning certain factors that influence growth and nutrition. About fifteen years before that date, he was conducting feeding experiments upon animals; and he observed that some of the animals that were being fed upon a combination of food materials which supplied all the elements required for proper nutrition were still not thriving on this ration. To be specific, goats upon which the feeding experiments were being tried were developing rickets; or, to use the technical phrase, they were becoming *rachitic*—their bones were growing weaker. The goats were

being fed straw and grains, and Professor Steenbock was studying particularly the intake and the outgo of minerals. Although the ration contained an adequate amount of mineral elements, the animals were not retaining calcium which they had previously assimilated; bones and tissues were letting go of the minerals which had been stored up before the experimental feeding began; and the goats were developing rickets.

Then the goats were put out into a pasture where they could feed upon green grass. Soon they showed that they were again assimilating mineral elements and were overcoming their rachitic condition. They remained in the pasture for some time, and were then brought indoors and fed again upon the straw-and-grain ration. It was observed that they now assimilated the mineral elements from this ration, and it was inferred that there must have been an activating factor gained from eating grass out-of-doors which continued to operate in the organism after the animals had been brought indoors and put on a straw-and-grain ration. What could this factor be? Professor Steenbock set about to find an answer to this question; and for twelve years he conducted a variety of experiments which show that this activating factor is a compound developed by light acting upon either food materials or upon an animal directly.

**The Effect of Light upon Activating Factors in Food.** It has long been known that cod-liver oil is valuable in preventing and curing rickets; that is, it is an anti-rachitic food, or one that causes normal assimilation of calcium in the animal or human organism. It has not been known, until recently, precisely what rôle cod-liver oil plays in the human organism in causing bones and tissues to assimilate mineral elements and to retain them when they have been assimilated. Professor Steenbock conceived the idea that cod-liver oil contains an anti-rachitic element which is developed in the codfish by light, or by the food that is eaten, and that this factor is fairly permanent and can incite calcium assimilation in the organism. The codfish lives, and its food is secured, in shallow water. Sunlight penetrates water readily, and it seemed reasonable to Professor Steenbock that the liver of the codfish stores up a vitamin which is developed by sunlight acting upon the codfish or upon the food that the fish consumes.

Taking this hypothesis as a basis for experimentation, he conducted experiments which proved that when an animal is subjected to sunlight, there develops this anti-rachitic element, which is called *Vitamin D*. Sunlight is, of course, a composite of different rays; it was probably the ultra-violet rays that were active in developing the anti-rachitic element in the animal organism. The experimenter knew that

ultra-violet rays could be produced by the quartz mercury-vapor lamp, so he proceeded to irradiate animals with this lamp. He observed that animals fed on the rachitic ration, that is, straw and grain, so that they were losing calcium from their bones and tissues, when subjected to ultra-violet rays from the quartz mercury-vapor lamp immediately began to assimilate calcium from their ration, and to retain the calcium which had already been assimilated, so that they commenced to thrive on a ration which previously produced a rachitic condition.

Experiments were then extended to young animals. It was found that the growth of a young rat could be stopped by feeding it on a ration that contained all the elements necessary for proper nutrition, but which did not contain the stimulating growth element, Vitamin D. But when young rats that had stopped growing were irradiated by the quartz mercury-vapor lamp, they began to grow again, although they were subsisting on the same ration that had previously caused arrest of growth. These experiments were continued in a variety of ways, until it was shown beyond doubt that animals subjected to ultra-violet rays will develop Vitamin D, which will activate the assimilation of calcium from food material.

**Irradiating Food so as to Develop the Activating Vitamin.** When it was evident that ultra-violet rays act upon animals so as to increase their power of calcium assimilation, attention was turned to the question of the relative values of different foods in respect to calcium assimilation; or, to put it in another way, Steenbock proceeded to study the foods that prevent or cure a rachitic condition in animals. His goats, when turned out into pasture where they could eat grass, began to assimilate mineral elements in their food; while previously, when they were kept indoors away from sunlight, they were unable to assimilate calcium and they actually lost what they had assimilated from earlier feeding. It followed inevitably, then, that foods acted upon by ultra-violet rays can develop the anti-rachitic element. Professor Steenbock has conducted extensive experiments which have shown that, when certain foods are irradiated, the anti-rachitic factor becomes active.

**Irradiation of Food May Influence Bodily Functions as Well as Growth.** Steenbock made a study of hay foods, in order to determine under what conditions they could be made most potent in activating calcium assimilation in the organism. Going into a field of hay, he would cut some of it, and allow part of it to cure in the sun and the rest of it in the dark. He then conducted metabolism experiments, and found that animals fed upon the sun-cured hay prospered better than animals fed upon the barn-cured hay. The conclusion to be

drawn from this fact was that hay cured in the sun developed the activating element, Vitamin D, while hay cured in the dark did not develop it.

Experiments were further extended to animal products, such as milk derived from goats and cows, and eggs derived from hens. Elaborate experimentation proved that milk obtained from goats or cows that had been irradiated either by sunlight or by the quartz mercury-vapor lamp contained the anti-rachitic element, while the milk obtained from non-irradiated cows or goats lacked this element. It is not known to-day exactly how it is possible for the animal organism when acted upon by ultra-violet rays to develop the stimulating Vitamin D, and to store it up in its milk or its muscles or the oil in its liver; but for our purpose, it is enough to understand that Vitamin D can be developed and can become incorporated in the milk and muscles of irradiated milk-producing animals.

This explains a fact which has long been observed, but the causes for which have not been understood heretofore. Young children will grow more rapidly on the milk of some cows than of others. Undoubtedly, the principal factor involved is that the milk of some cows contains Vitamin D in a higher degree than is true of the milk of other cows. Take, for instance, a cow that is being fed on hay that has grown in a cloudy, foggy region, and that has been cured in the dark. Then take another cow that is being fed hay that has been grown and cured in the sunlight. Other things being equal, milk from the latter cow will promote calcium assimilation in the nutrition of a young child more efficiently than milk from the former cow.

Professor Steenbock extended his experiments to hens. He found that he could influence egg production by irradiating hens and the food they eat. Hens living on irradiated foods range higher in egg productivity than do hens living on a non-irradiated ration. Also, hens subjected directly to the quartz mercury-vapor lamp show increased activity in egg production. Further, the eggs obtained from irradiated hens or those living on irradiated food have firmer shells than those secured from non-irradiated hens, or from those living on a rachitic-condition ration. Once more, eggs from irradiated hens possess a higher degree of hatchability than those from non-irradiated hens; and hens that were developing a rachitic condition so that they could not eject their eggs, recovered their power when put upon an anti-rachitic ration or subjected to irradiation from the quartz mercury-vapor lamp. See ULTRA-VIOLET RAYS; VITAMINS. M.V.O'S.

**Harry Steenbock** (1886- ), a specialist in agricultural chemistry, born in Wisconsin. He received

three degrees in the University of Wisconsin, and also studied in Germany. He began instructional work in the University of Wisconsin in 1908, and has been continuously in that university since then. Professor Steenbock has devoted his time and energies quite largely to experimental work in agricultural chemistry, and has shown exceptional skill and acumen in the study of problems in his field, particularly in animal nutrition and the effect of ultra-violet light on metabolism. For his discovery of the effect of ultra-violet light on the nutritive value of grains, as sketched, he was offered a very large sum by food manufacturers, but he declined to take money for his personal use. All the proceeds from his discovery were placed in a research fund in charge of a committee of the alumni of the University of Wisconsin. The fund is now being devoted to research in the field of nutrition.

**HUMANITARIANISM.** See SOCIOLOGY (Applied Sociology).

**HUMBER RIVER**, a short waterway in England, flowing eastward between the counties of York and Lincoln and emptying into the North Sea. It was by this river that the Norsemen invaded the country, in the ninth and tenth centuries. With its tributaries, the Ouse and the Trent, which rise in the northern and central parts of the island, respectively, the Humber forms an important water system for exporting and importing raw and manufactured products. Varying from one to seven miles in width, it is navigable for the largest steamers for about half of its forty-mile course. Hull and Great Grimsby are the two most important cities on its banks. See ENGLAND (English Rivers).

**HUMBERT I** (1844-1900), king of Italy, eldest son of Victor Emmanuel II, was born in Turin. In 1866, during the war between Prussia and Austria, he commanded a division of the Italian army and served with skill and bravery. In 1868 he married his cousin, Marguerite of Savoy, and succeeded to the throne on the death of his father in 1878. The queen survived her husband twenty-five years. The most notable event of Humbert's reign was the formation in 1891 of the Triple Alliance, between Italy, Austria, and Germany, which remained in force until Italy opposed the Germanic powers in 1915 in the World War. This alliance resulted in heavy taxation of an already financially depressed country, and tended to lessen the popu-

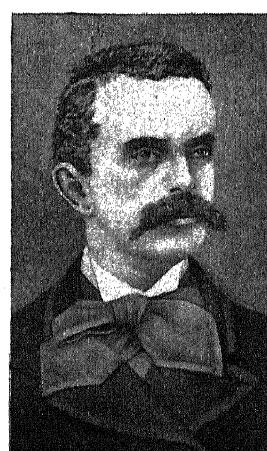


Photo: Brown Bros.

HUMBERT I

larity Humbert had achieved during the early part of his reign. Three attempts were made upon his life. One at Naples, in 1878, and another near Rome, in 1897, were unsuccessful; on July 29, 1900, he was killed by the anarchist Bresci. The present king, Victor Emmanuel III, is his son. See VICTOR EMMANUEL (II and III); ITALY (History: The Modern Kingdom); TRIPLE ALLIANCE.

**HUMBLEBEE.** See BEE (The Bumblebee).

**HUMBOLDT, ALEXANDER, BARON VON** (1769-1859), the founder of the modern science of physical geography, which he described in the picturesque book called *Cosmos*, written in 1845. Although born in Berlin, he grew up in the quaint old Castle of Tegel near Potsdam, studying with his elder brother Wilhelm under private tutors, until he entered the University of Frank-

fort-on-the-Oder. From childhood he always was interested in natural history, especially rock formations and flowers, so his studies were mainly along that

line. While in Berlin, he met George Forster, the famous naturalist who had accompanied Captain Cook on his expedition around the world. The two became great friends, for Forster's love of freedom and travel fascinated young Humboldt, and the latter determined to go on a trip of exploration. In 1790, after a short trip through Holland and England, he published his first work, entitled *Observations on the Basalt of the Rhine*.

His passion for travel was strengthened by his studies; so in 1797 he resigned his position as superintendent of mines under the Prussian government, and, after being disappointed in an exploring trip which had been planned and then abandoned by the French government, he resolved on his own account to visit the interior of South America. With a friend, he fitted up the small vessel *Pizarro*, on which the two men left to explore unknown regions. For five years the travelers were constantly exploring the great rivers, plains, and mountains of the southern continent.

In 1804 Humboldt returned with his party to Paris, where he spent twenty years writing up his observations and scientific investigations, which are included in seven large volumes. In 1827 the king of Prussia asked him to live in Berlin, and his home thereafter was in that city; a portion of the time he resided at the court. The year he moved to Berlin he

delivered a remarkable series of lectures which formed the basis for his *Cosmos*. This book contained the most complete description of the physical universe that had been written up to that time.

**HUMBOLDT CURRENT.** See PACIFIC OCEAN.

**HUMBOLDT GLACIER.** See ARCTIC LANDS AND SEAS (Ice Formation).

**HUMBOLDT RANGE.** See NEVADA (The Land).

**HUMBOLDT RIVER,** the longest water-way of Nevada. It rises in Elko County, in the northeastern part of the state, and flows southwesterly for about 350 miles into Humboldt Lake. Its course is through a barren region whose soil is chiefly alkaline, and its waters are so saturated with alkali that they are salty. This narrow stream, in some places only a few yards wide, cuts through rugged mountain peaks and a valley which is the only pass extending east and west through the mountains of the state. See NEVADA (Rivers and Lakes).

**HUME, DAVID** (1711-1776), author of important principles of modern political economy, and a noted historian. He also influenced, to

a great degree, the philosophic thought of the eighteenth century. Hume was born in Edinburgh, the younger son of the laird of Ninewells in Berwickshire. His first work, published in 1739 and 1740, was the *Treatise upon Human Nature*, which was a valuable contribution to the science of psychology.

Hume taught that one could not have ideas or thoughts except such as were derived from impressions gained through the several senses, either directly or by means of memory images.

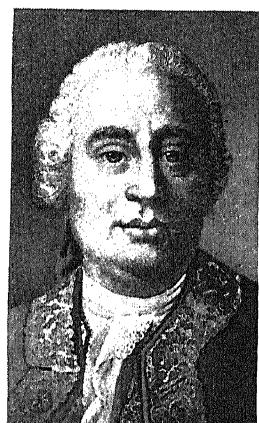
**HUME DAM** (Australia). See MURRAY RIVER.

**HUMERUS.** See ARM.

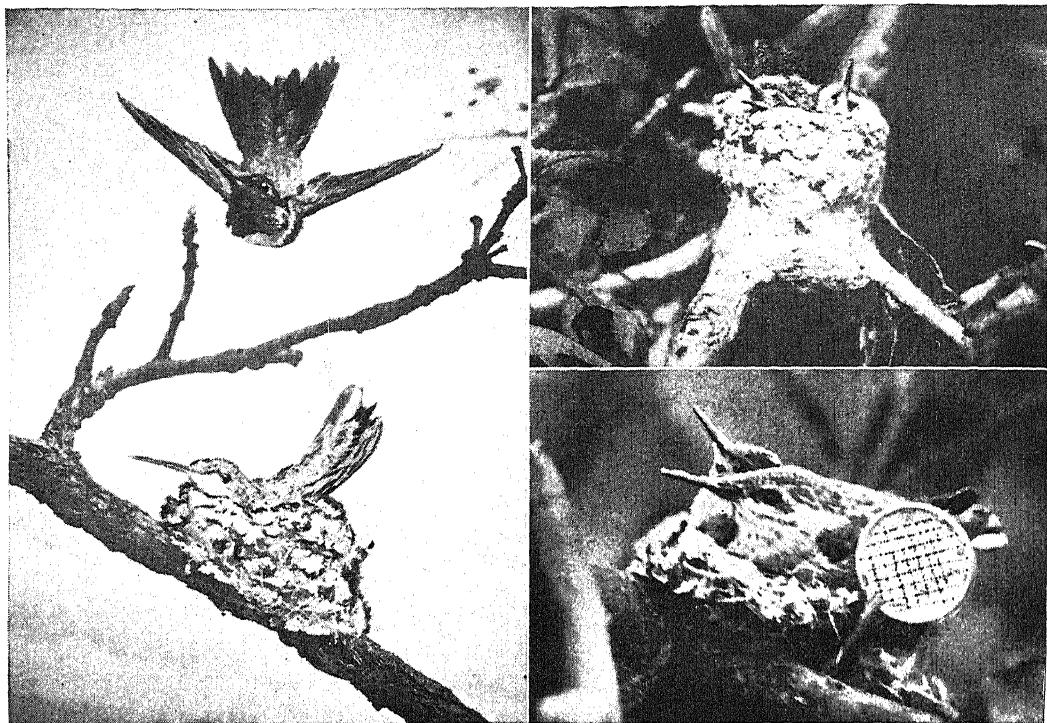
**HUMIDITY.** As the moisture from the seas, rivers, and lakes evaporates, it fills the air with water vapor, a condition of the atmosphere which is described by the term *humidity*. When the air contains a great deal of vapor and feels damp, the humidity is said to be high, but if very little moisture is present, the humidity is low. Usually, the air is not completely filled with water vapor, unless it is raining; the amount varies greatly with the



HUMBOLDT



DAVID HUME



Photos: Visual Education Service; O R O C

## SOME OF THE HUMMING BIRDS

At left, a pair of ruby-throated, and another detail of nest of this species in the upper right illustration. Below, a pair of humming birds, compared in size with a twenty-five-cent piece.

temperature and location. The higher the temperature of the air, the greater the amount of vapor it may contain. When as much moisture is present as the atmosphere can hold at a certain temperature, the air is said to be saturated, or at the *dew point*. The lower air over the ocean is usually almost saturated, while far inland, in desert regions, the air is very dry.

The ratio of the amount of water vapor in the air to the amount required for saturation at that temperature is called the *relative humidity*. Thus, if the air contains one-half the amount of vapor which it can hold, the relative humidity is fifty per cent. Wherever the land is agriculturally productive without irrigation, the relative humidity is about sixty-five per cent. A person feels "sticky" and uncomfortable when the humidity is too high, for the perspiration of the skin does not evaporate easily; but, on the other hand, too little humidity is injurious to the health. For this reason, some means should be adopted for getting vapor into the atmosphere in a heated living room. Basins of water may be kept on registers, a jet of steam may be allowed to escape from a radiator, or a water pan may be kept in a furnace (see HEATING AND VENTILATION). The amount of moisture in the air is

determined in various ways, but generally a form of hygrometer, consisting of two thermometers, is used.

R.H.W.

**Related Subjects.** The reader is referred in these volumes to the following articles:

|       |             |            |
|-------|-------------|------------|
| Cloud | Evaporation | Hygrometer |
| Dew   | Fog         | Rain       |

**HUMMING BIRD**, the name of a family of birds including the smallest species known. Their name refers to the whirring sound made by their wings. They have no singing note. Humming birds are further distinguished for their brilliant plumage and their rapid, darting flight. Of the more than 400 species that have been identified, only eighteen are known in the United States; of these, all but one species belong to the Southwestern and Pacific coast states. The smallest of the humming birds, when stripped of their feathers, are no larger than a bumblebee, and only a few are over six inches long. The largest is a native of the South American Andes, which grows to be eight and one-half inches in length. The long, slender bills of these birds are especially adapted for sucking the sweet nectar of such flowers as the honeysuckle, the clematis, and the deep-cupped trumpet flower. The tongue, too, is long, and is forked at the tip, constitut-

ing a very efficient implement for procuring food. Insects, however, form an important part of their diet, and they seize them within the recesses of flowers, and also while on the wing. Sometimes they invade the web of the spider and snatch away its prey.

**Ruby-Throated Humming Bird.** This, the smallest and daintiest of the birds of the United States, is the only one of the humming-bird family found east of the Mississippi River and north of Florida. In winter it seeks the warm regions from Florida to Central America, but between May and October it may be found from Southern Canada to the Gulf of Mexico. Less than four inches long, and clothed in a brilliant coat of bright, metallic green, it well deserves the characterization of James Whitcomb Riley, in his *South Wind and the Sun*:

And the humming bird that hung  
Like a jewel up among  
The tilted honeysuckle horns.

This beautiful creature seems indeed to be a "winged jewel" as it hangs poised in midair before a deep-throated flower. The next instant it flashes out of sight, scarcely giving the observer time to note the brilliant throat and breast, which is metallic-red in one light, orange-flame in another, and in still another a dusky orange. Its tiny cradle, made of shreds of bark, soft grass, and bits of plant down or cat-tail fluff, is no less exquisite than itself. The mother bird prefers a situation high up in the branches, and very often she covers the outside of the nest with lichens or bits of bark that blend so harmoniously with the background one hardly knows the little home is there. During the nesting season, the male bird assumes an air of boldness, and he will fight intruders, larger than himself, with remarkable agility and fearlessness. Two tiny white eggs are laid, and the young are hatched without feathers. D.L.

**Scientific Name.**  
Humming birds constitute the family *Trochilidae*. The ruby-throated is *Archilochus colubris*.

**HUMMING-BIRD MOTH.** See HAWK MOTH.

**HUMPERDINCK**  
*hoom' pur dingk, EN-*  
*GELBERT (1854-1921)*,  
a German composer best known for his children's operas, or musical fairy plays, *Hänsel und Gretel*, *The Snow Maiden*, and *The Royal Children*. He was born at Bonn, was an especial friend and protégé of



Photo: Brown Bros.  
HUMPERDINCK

Wagner, and it was he who prepared and coached the first cast of Wagner's *Parsifal* at Bayreuth, in 1882. Humperdinck wrote many songs, some chamber music, and a few choral works. His *Moorish Rhapsody* for the orchestra embodies his impressions of Southern Spain. He also wrote incidental music to several of Shakespeare's plays, including *The Merchant of Venice*, *A Winter's Tale*, *The Tempest*, and *As You Like It*. However, he was most successful in his rendering of delicate folklore and fairy themes. His last opera, *Die Marketenderin*, was produced in Cologne in 1914.

**HUMPHREYS, WEST H.** See IMPEACHMENT.

**HUMPTY DUMPTY.** See LANGUAGE.

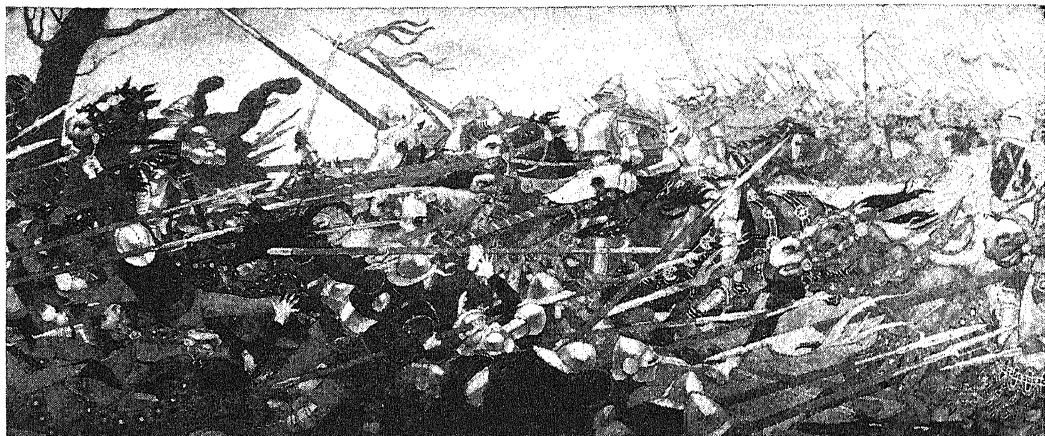
**HUMUS**, *hu' mus*, from a Latin word meaning *ground*, is organic matter decomposed in the soil. When vegetable matter decomposes, its elements of carbon, oxygen, hydrogen, nitrogen, etc., pass off in various forms, such as water, ammonia, and carbon dioxide; some decomposed parts are carried into the earth in solution, and perform no work of consequence in nature's plan. What remains of the decomposed matter is given the name *humus*, and it was long ago discovered to be one of the most important constituents of the soil. Usually where you see rich, dark-brown or black soil, the color is imparted by humus, but just what its chemical composition may be is not well understood. Humus is present always in peat bogs, and it is found in all agriculturally rich surface soil. It is the chief source of nitrogenous plant foods. See SOIL (Kinds); NITROGEN; PEAT.

**HUNDRED**, a medieval political designation of a unit of territory in England; it was less extensive in area than a shire (county), but was larger than a parish (town). The origin of the word is lost in obscurity. Some of the hundreds were only two square miles in extent, while others covered three hundred square miles. Their political status was somewhat like the relation of an American township to the county of which it is a part, or a county in its relation to the state; in many of their functions, they enjoyed independence of the larger administrative areas of which they were units. Each hundred had a court, known as the Hundred Court. Sessions were held frequently, during the thirteenth century as often as seventeen times a year; its decrees were as authoritative as those of the courts of larger political divisions. The system of hundreds began to lose prestige during the reigns of the Tudor sovereigns.

**HUNDRED DAYS, THE.** See ELBA; BONA-PARTE, NAPOLEON.

**HUNDRED FALLS, OR GREAT AUGHRABIES.** See ORANGE RIVER.

**HUNDREDWEIGHT.** See DENOMINATE NUMBERS (Tables of Weight Measures).



From painting by De Monvel

Photo: Brown Bros.

**"THE TURMOIL OF CONFLICT"**

The figure of Joan of Arc may be seen in the center of the oncoming host, in the upper right of the illustration.

**HUNDRED YEARS' WAR**, a protracted struggle between England and France, which began in 1337 and ended in 1453. It lasted during the reigns of five English kings, from Edward III to Henry VI, and of five French kings, from Philip VI to Charles VII. One of its chief causes was Edward III's claim to the French throne because his mother was a sister of Charles IV of France. The Battle of Crécy, fought in 1346, at which gunpowder was first used, was the first important engagement, although the war began nine years earlier. The English gained a complete victory at Crécy, and ten years later were victorious at Poitiers. They lost ground, however, in spite of these victories, and were driven from the country. The English had practically no holdings in France when Charles VI ascended the throne, in 1380.

War broke out again in 1415. France, weakened by internal dissensions, could not successfully repel its enemy, and in 1420 Henry V compelled Charles VI, by the Treaty of Troyes, to acknowledge him as his heir. In 1429, spurred on by Joan of Arc, France gradually forced the English to surrender their gains, and at the end of the war, Calais was the only

French territory held by the English. This was not regained for a century.

**Related Subjects.** The reader is referred in these volumes to the following articles:

Calais

Crécy

Joan of Arc

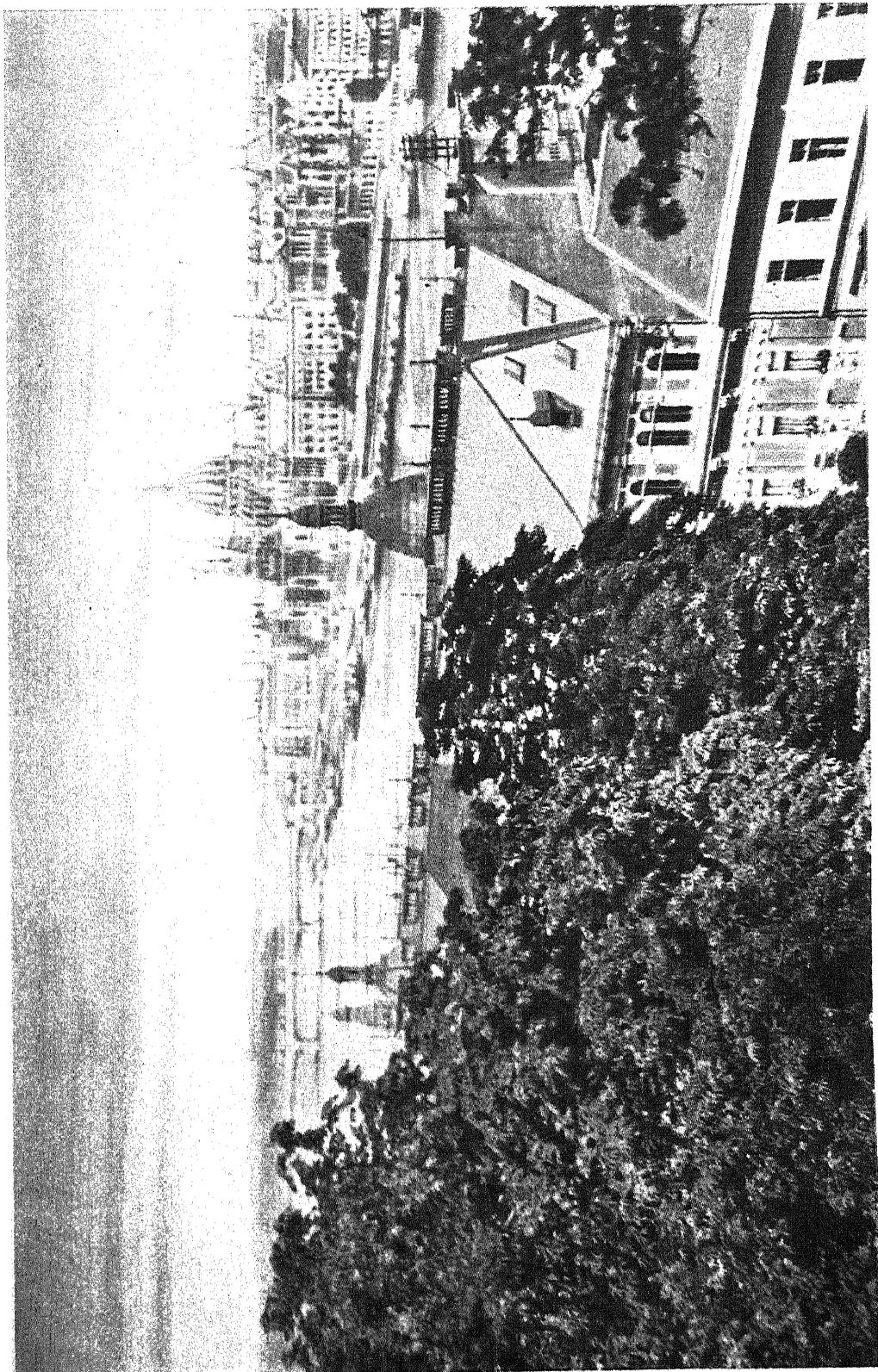
**HUNGARY**, one of the two states that comprised the Austro-Hungarian Monarchy before the dismemberment of the Dual Monarchy through its defeat in the World War. Hungary, like Austria, is now a separate, independent country, greatly reduced in area and in prestige. The old Hungarian kingdom formed a compact area that lay within the crescent-shaped curve of Austria, the whole lying south of Eastern Germany and of former Russian Poland, and north of the Balkan Peninsula. Having a total area of 125,641



THE BATTLE OF CRÉCY

Photo: Brown Bros.

square miles, Hungary was made up of Hungary proper; the historic province of Transylvania, which had united with Hungary in 1848; the self-governing crownland of Croatia and Slavonia; and the city and district of Fiume, geographically a part of Croatia, but politically a separate division within the kingdom. The Hungarian realm covered more than half the area of Austria-Hungary, but its population of 20,886,487 (census of 1910) was only about



THE HISTORIC DANUBE AND THE QUEENLY CITY OF BUDAPEST





THE OLD AND THE NEW HUNGARY

At the left, the black area was the old kingdom of Hungary, a part of the Dual Monarchy of Austria-Hungary; at the right is the new Hungary of 1919, with the new states north and south.

forty per cent of the total population of the Dual Monarchy (see maps in the article AUSTRIA-HUNGARY).

Austria and Hungary had a common sovereign, who ruled as emperor of Austria and king of Hungary. Each country had its own Parliament, meeting in Vienna and Budapest, respectively, but foreign, military, and financial matters were disposed of jointly. The dominant people in Hungary were the Magyars (a synonym for Hungarians), numbering over 10,000,000. In Transylvania, Rumanians were in the majority, and in Northern Hungary there was a large proportion of Slavs, chiefly Slovaks and Ruthenians. Serbs and Croats, members of the South Slav group, predominated in Croatia-Slavonia. Hungary therefore had its racial problems before the Treaty of Trianon caused the kingdom to be shorn of over two-thirds of its territory and millions of its people.

**Boundaries and People.** The new Hungary is a minor state with an area of 35,916 square miles, or about that of Indiana. It is bounded on the north by Czechoslovakia, a republic to which Hungary was forced to cede northern territory in the Carpathian Mountain region, with over half the population Slovak. Austria, on the west, is itself a small, weak republic. Yugoslavia, one of the states erected on the dismembered Dual Monarchy, lies on the southwest and south. Both Austria and Yugoslavia possess former Hungarian territory. Austria was awarded over 1,500 square miles of German-settled land (Burgenland) in the western part of the kingdom. Yugoslavia has Croatia and Slavonia as one of its provinces, and another province, Vojvodina, is also made up of former Hungarian territory, including portions of the Banat of Temesvar. To Rumania, which lies to the east, Hungary ceded Transylvania and bordering districts and parts of the Banat (for other details see TRIANON TREATY OF).

In the new kingdom, the Magyars number about 7,150,000. There are, besides, over 550,000 Germans, about 142,000 Slovaks, and smaller numbers of Rumanians, Croats, Serbs, and other races. In the countries which benefited by the change of Hungary's boundaries, there are 3,500,000 Magyars, and they and their countrymen in what is left of Hungary regard the plight of their fatherland with bitter and rebellious feelings. The peasants, numbering 4,500,000, are now the dominant group in the population. They are a picturesque people, who cling to the colorful costume that has been worn by the Hungarian peasantry for centuries. The landowning aristocracy includes a highly intellectual and intensely patriotic element of the population.

**Principal Cities.** Hungary's largest city and capital, Budapest, is treated elsewhere under that title. Other important cities are described below:

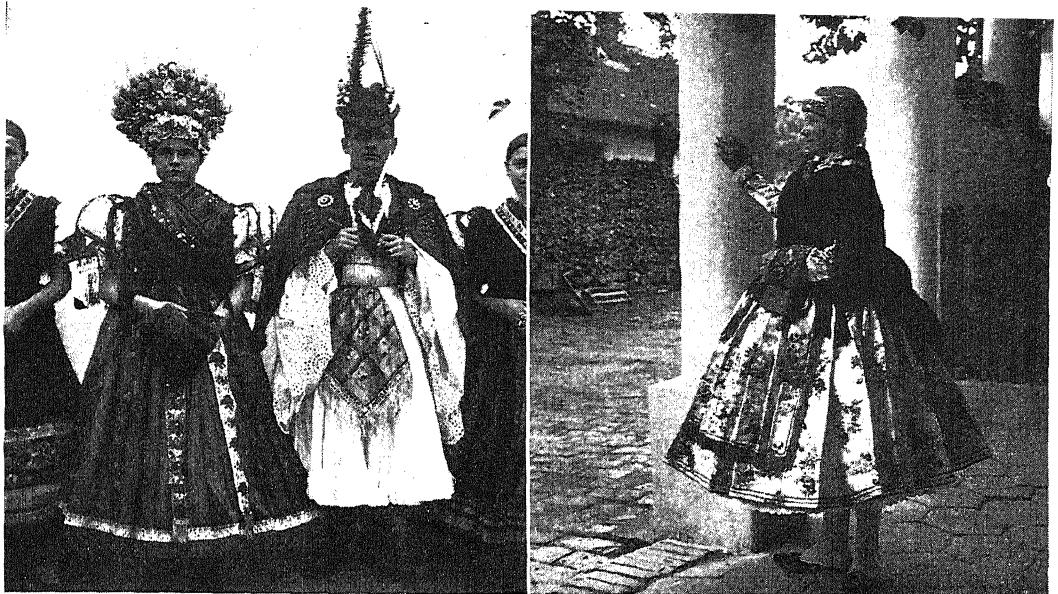
**Szeged**, *seg' ed*, the second city in population, is situated on the west bank of the Tisza River, 118 miles southeast of Budapest. The city is the commercial center of a fertile agricultural area, and before the war it enjoyed a prosperous trade in grain, wool, and tobacco. After a disastrous flood, which overtook the city in 1879, Szeged was rebuilt, becoming a modern municipality with broad, circular avenues, beautiful public squares, and stately public buildings. Fine quays extend along the river, and a dam has been erected to prevent further damage to the city. As a manufacturing center, Szeged is noted for its soap and various food products, such as Hungarian pepper (paprika). Population, 120,000.

**Debreczen**, or **Debrecen**, *deb' reh tsen*, the third city in size, is situated on a sandy plain, about 137 miles east of Budapest. Although it is a town of antiquity, only a few old landmarks remain as reminders of the past. The walls of the ancient city have given way to broad boulevards, and a modern city spreads out into the plains. Numerous educational institutions are located in Debreczen, the most famous of which is the Reformed Collegium, founded in 1531. Because of the power of the Reformed Church in Debreczen, it is sometimes called the "Protestant



Photos: O R O C

Home Life in Hungary (1). A peasant's home in Northeast Hungary. Peasants in ordinary costume watching a street procession in Budapest.



Photos: O R O C

**Home Life in Hungary (2).** Bride and groom in prescribed wedding garments. A woman in national costume. Shepherd on the plains, watching his flock. Young men in national costumes, still seen in many parts of the country.

Rome." Large city-owned cattle ranches are chiefly responsible for the importance of the city as a cattle market. Population, 105,000.

**Physical Features.** Hungary occupies the greater part of the plain of the Middle Danube. That river enters the country in the extreme northwest, runs through it easterly for about a hundred miles, and then flows southward into Yugoslavia, passing through Budapest, in the far north. The Carpathian Mountains sweep in a wide curve above the northern and eastern boundaries, while the Alps and Balkan ranges form a barrier on the west and south. The only river of importance besides the Danube is the Tisza, which traverses the country from north to south in the eastern part. Most of Hungary is a level plain. The only timber and mineral resources left are found in a range of hills and mountains in the west, extending from southwest to northeast, and crossing the Danube above Budapest. Hungary has a typical continental climate, the summers being hot and rather dry, and the winters very cold. There is a moderate rainfall.

**Industry and Commerce.** The chief industry of Hungary is agriculture. The alluvial soil of the plain produces good crops of wheat, corn, rye, barley, potatoes, and sugar beets, and there is a profitable grape industry. As in the Great Plains region of the United States, the breeding of horses and cattle has long been a typical Hungarian industry, but much of the natural pasture area has been converted into plowland, and the herds are not so large as formerly. Swine, sheep, and poultry also are raised.

The leading manufacturing industries are dependent on agriculture, and include flour-milling, sugar-manufacturing, distilling, and the working of hemp and flax. There is some iron and steel manufacture, one iron-ore mine having been left to the country. With eighty-six per cent of its forests and all of its mercury, gold, silver, copper, and salt mines transferred to other countries, Hungary's lumbering and mining industries are centered chiefly in the western hills, where coal is found in considerable quantities. In the northeastern part of the country, Hungarian wines of the best quality are produced. Budapest is famous for its flour mills; in this city the first roller-process mills were successfully operated.

Hungary's chief exports are flour, live animals and animal products, grain, sugar, and electrical machinery. It imports coal, lumber, and manufactured products in wide variety. Trade is carried on principally with Austria and Czechoslovakia.

**Education and Religion.** Hungary has compulsory education for children between the ages of six and twelve, and attendance for three years in continuation schools is also required. Four universities and sixteen theo-

logical colleges are in operation; of the latter, twelve are Roman Catholic, representing the largest number of church members in the country. Religious liberty is granted to all.

**Government.** In 1918 an unsuccessful attempt was made to establish a republic. In 1919 a Soviet government was organized, and this, in turn, was soon superseded by a monarchial régime which put the old Constitution into force. Charles I of Austria having renounced his exercise of power in 1918, Hungary was declared a monarchy with a vacant throne, and the administration of affairs was entrusted to a regent. There is a national legislative body of two houses, and a Cabinet of ten members.

**History.** The Hungarians, who are correctly called Magyars, are related to the Finns, and are not to be confused with the Huns who helped to destroy the Roman Empire. Entering the present territory of Hungary at the beginning of the tenth century, the Hungarians, who were then in a state of barbarism, conquered the Slavic tribes in the basin of the Middle Danube, and made numerous settlements. Having adopted a civilized mode of life, they became converts to Christianity before the end of the century, and under Stephen, crowned first king of Hungary in 1000, made rapid progress. Under the reign of the great monarch Matthias I (son of John Hunyadi), who became king in 1458, Hungary reached the height of its glory, for no reigning monarch of the time could rival Matthias in military genius, love of learning, and statesmanlike ability. But with his death in 1490, there began a period of factional strife and anarchy, of which the watchful Turks were swift to take advantage. On August 20, 1526, occurred the great Battle of Mohacs Field, in which the Hungarians were completely defeated, the king and 20,000 of his soldiers falling in the fight.

As a result, nearly all of the kingdom of Hungary was conquered, Buda, the capital, with its surrounding territory, falling to the Turks, while the Hapsburgs held the western territories. Exasperation over the religious and political persecutions of Vienna led to a rising in which a faction of the Hungarians called their century-long enemies, the Turks, to their aid, and in 1683 Vienna was all but forced to surrender to the Moslems. John Sobieski saved it, however, and three years later, Buda was also wrested from the Turks. In gratitude for the deliverance from the Turks, Parliament recognized the hereditary claims of the Hapsburg family, by legal enactment.

In the early eighteenth century, a rebellion lasting twelve years agitated the Hungarians, but Maria Theresa, empress of Austria, aroused their feelings of loyalty, and they aided her in her struggle against Frederick the Great. During the later eighteenth and early nineteenth centuries, however, discontent was constantly



Photo: O R O C

## HUNGARIAN ROYAL PALACE BUILT FOR FRANCIS JOSEPH

He had complained that he lived in the Austrian capital, Vienna, because there was no fit place for him in Budapest. After the palace shown above was built, he refused to be reconciled to a lengthy sojourn in the Hungarian capital, and it is declared he stayed there only a half hour each year—just long enough to comply with the law of the Dual Monarchy, which required that he reside in both capitals.

growing, and in 1848 a revolt broke out under the leadership of Louis Kossuth. The intervention of Russia made all efforts vain, and it was not until 1866, when Austria suffered so sharply at the hands of Prussia, that the Hungarians regained their constitutional liberty. Under Francis Deak, Hungary made certain demands, and these were acceded to in the *Ausgleich* of 1867, the instrument which established the Dual Monarchy of Austria-Hungary. Francis Joseph was crowned at Buda on June 8, 1867, as king of Hungary, and succeeded in making himself very popular with his Magyar subjects. He died in 1916, in the midst of the World War, and was succeeded by his grand-nephew, Charles I.

[For an account of the joint history of Austria and Hungary from the time of the *Ausgleich* of 1867 until the break-up of the Dual Monarchy, see AUSTRIA-HUNGARY (History); see, also, WORLD WAR.]

In November, 1918, immediately after the surrender of the Central Powers, Charles withdrew the exercise of his royal prerogatives, and appointed Count Michael Karolyi Prime Minister. To the surprise of everybody, Karolyi, a few days later, proclaimed Hungary a republic and himself its President. In this move he was supported by the Communists, who began forming Soldiers and Workers' Soviets. As the year wore on, the people were driven to desperation by hunger and lack of the necessities of life, and in March, 1919, a more radical form of government was established under the leader-

ship of Bela Kun, a follower of the Russian Lenin. Bela Kun's Soviet government was in power but a few months, for the Hungarian people as a whole are not radical in thought or sympathy.

In January and February, 1920, elections were held for representatives to a new Parliament. That body authorized a continuance of the pre-war Constitution, and Admiral Horthy was elected regent. Two attempts of King Charles to regain the throne met with failure, but the economic and financial condition of the country was so dubious during 1922 and 1923 that the government appealed to the League of Nations for a loan. Jeremiah Smith, an American, was appointed financial supervisor in 1924, and by 1926 the reconstruction of the country was declared complete. J.P.

**Related Subjects.** Including the references given above the reader is referred in these volumes to the following articles:

|                      |                    |
|----------------------|--------------------|
| Austria              | Kossuth, Louis     |
| Austria-Hungary      | League of Nations  |
| Budapest             | Magyars            |
| Carpathian Mountains | Maria Theresa      |
| Charles I            | Slavs              |
| Danube River         | Soviet             |
| Francis Joseph I     | Trianon, Treaty of |
| Hapsburg, House of   | Yugoslavia         |

**HUNGER.** See APPETITE.

**HUNS,** *hunz*, a wandering and warlike tribe of the Mongolian race, who made hostile invasions into the Roman Empire. Under Attila, their greatest leader, they almost destroyed the

empires of the East and West. They crossed the Volga about A.D. 350, totally defeated and afterward united with the Alani, another barbarous tribe, and then conquered the Goths. With various subject tribes, the Huns then invaded Gaul, under the leadership of Attila, and were finally defeated, about A.D. 451. Their fate is uncertain, but it is supposed that they were merged in later invading barbarian tribes.

C.W.

**Related Subjects.** The reader is referred in these volumes to the following articles:

|        |       |      |      |
|--------|-------|------|------|
| Attila | Goths | Gaul | Rome |
|--------|-------|------|------|

**HUNT, HELEN FISKE.** See JACKSON, HELEN FISKE HUNT.

**HUNT, [JAMES HENRY] LEIGH** (1784-1859), an English journalist and poet, some of whose best work was produced under circumstances that would have defeated the average man. After spending eight years at Christ's Hospital, Hunt went to London, where he remained for two years, writing verses and wandering about the city under the tutelage of a minister, who had a collection of the boy's poems published in 1801. In 1808 Hunt and his brother began to publish the *Examiner*, a newspaper, and in 1812, when the paper attacked the Prince Regent through its editorial columns in an article entitled *The Prince on Saint Patrick's Day*, the editors were tried and condemned to two years' imprisonment and to pay a fine of £1,000 (\$5,000). The poet was sent to Horsemonger Lane jail, and he directed the *Examiner* from there with unabated energy. Some of his best sonnets were published during his imprisonment, from 1813 to 1815.

His collection of poems, *Foliage*, was published three years after he was released, and in 1819 he began a weekly newspaper called the *Indicator*, in which some of his best essays appeared. In 1822 he went to Italy and conducted a newspaper called the *Liberal*, which was not successful. Hunt's *Autobiography* is a complete and individual expression of the man. His works as poet and critic are a notable contribution to nineteenth-century literature.

**Representative Titles.** Among his books are *Men, Women, and Books*; *Jar of Honey from Mount Hybla*; *Imagination and Fancy, Wit and Humor*; *The Town*; *The Story of Rimini*; *Palfrey, a Love Story of Old Times*; *Legend of Florence*, a play; and *Book of the Sonnet*, which was published after his death.

**HUNT, RICHARD MORRIS** (1828-1895), an American architect who exercised an artistic influence on his profession. He was born at Brattleboro, Vt., and was a brother of William Morris Hunt, the painter. When only fifteen years of age, he went to Paris and to Geneva, Switzerland, to study architecture. He traveled through Europe, Egypt, and Asia, and then was employed for a time on the new Louvre in

Paris, under his old master, Lefeuil. In 1855 Hunt returned to America and worked with Thomas Ustic Walter on the Capitol extension in Washington. A studio for architects, established by him in New York, was the pioneer of all architectural training schools in America. In 1888 Hunt became president of the Institute of Architects, and was honored by the receipt of decorations from foreign learned societies. A beautiful memorial was erected in his honor in New York in 1898 by the associated architectural societies.

**Summary of His Work.** Among the noted buildings he designed are the Lenox Library and the *Tribune* Building in New York, the Divinity Building at Yale, the Fogg Museum at Harvard, and the World's Fair Administration Building in Chicago. He also planned the Yorktown Monument and the pedestal of the Statue of Liberty in New York Harbor. Some of the most palatial private houses in the United States were built by him, including the "Breakers" at Newport, the country home of George Vanderbilt at Biltmore, S. C., and the mansion of W. K. Vanderbilt in New York.

**HUNT, WILLIAM MORRIS** (1824-1870), an American painter, was born at Brattleboro, Vt., and educated at Harvard College. After graduation, he settled in Boston. While in Europe for study, he became a pupil and friend of Millet, the French painter. Although Hunt executed several portraits of famous Americans, numerous figure subjects, and many fine mural decorations (notably at the state capitol at Albany, N. Y.), he was at his best in his landscapes. His most noted work, *Gloucester Harbor*, is a brilliant bit of sky and water, but his *Falls of Niagara* is full of grandeur. Two of his figure subjects, *The Hurdy-Gurdy Boy* and *Girl with the Kittens*, hang in the Boston Museum. In all his paintings, Hunt showed a remarkable technique and fine feeling for color. Richard M. Hunt, the architect, was his brother.

**HUNT, WILLIAM HOLMAN.** See PRE-RAPHAELITES.

**HUNTER COLLEGE.** See NEW YORK (Education).

**HUNTER MOUNTAIN.** See CATSKILL MOUNTAINS.

**HUNTING.** See GAME.

**HUNTING LEOPARD.** See CHEETA.

**HUNTINGTON, IND.** See INDIANA (back of map).



Photo: Brown Bros.

**WILLIAM MORRIS HUNT**

**HUNTINGTON**, W. VA., an important shipping point for coal, iron, salt, and lumber, and the county seat of Cabell County, is situated in the westernmost section of the state, on the Ohio River, just below the point where it receives the waters of the Guyandotte River. Charleston, the state capital, is fifty miles east by rail, and Cincinnati, O., is 160 miles northwest by water. The Chesapeake & Ohio Railroad, constructed to the city in 1871, and the Baltimore & Ohio, built in 1892, provide railway accommodations. Electric lines connect with adjacent cities east and west, and there is steamer communication with all important river ports.

The city was settled and founded in 1870 and named for Collis P. Huntington, capitalist and railroad-builder, who selected the site. In 1909 the commission form of government, with four commissioners, was adopted. The area is a little more than twelve square miles. Population, 1928, 68,000 (Federal estimate).

**Industry and Institutions.** Huntington is a busy industrial city, with wholesale houses, shops of the Chesapeake & Ohio, car works and foundry, a steel plant, machine shops, and factories producing glass, china, furniture, and other products. It is the site of Marshall College (a state normal), West Virginia Asylum for Incurables, and Douglas High School for colored students.

C. OF C.

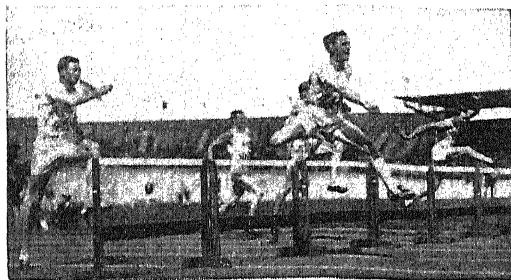
**HUNTSMAN**, THE, in astronomy. See BOOTES.

**HUNTSMAN'S CUP.** See PITCHER PLANTS.

**HUNTSVILLE**, ALA. See ALABAMA (back of map).

**HUNYADI-JÁNOS**, *hoon' yod ie yah' noshe*. See MINERAL WATERS.

**HURDLING**, a foot race in which the contestants run and jump over a number of fence-like obstacles called hurdles. The object of a



A HURDLE RACE

Photographed at the Olympic Games in Amsterdam, Holland.

hurdler is to clear the obstructions with the least possible interference to his stride and the least necessary rising from the ground. His feet and legs almost graze each bar, sometimes overturning a hurdle, though if a runner upsets a stated number of hurdles (usually either three or four), he is disqualified. There are high and

low hurdles, the distance for which they are used being 120 yards for high, and 220 yards for low hurdles. The high hurdles are ten in number and are set ten yards apart; the first is fifteen yards from the start, and the last an equal distance from the finish. Their height is three feet six inches. The low hurdles are equal in number, but are placed twice as far from each other; they are only two feet six inches high.

In America the hurdle race is usually run on a cinder track; in England, on the grass, and the hurdles are fixed so that they cannot be knocked down. In the Olympian Games (which see) the distance for hurdle races is made 440 yards.

**HURDY-GURDY.** See HAND ORGAN.

**HURON**, LAKE, one of the five Great Lakes of North America, between Michigan and Ontario, forming a part of the boundary be-



LOCATION MAP

The relative position of Lake Huron in the Great Lakes chain is shown in black in the small corner map.

tween the United States and Canada. Its length from north to south is about 250 miles; its average width is about 155 miles; and its area, including Georgian Bay, the principal arm, and North Channel, is 23,800 square miles. It is therefore nearly as large as the state of West Virginia. Huron's elevation above sea level is 581 feet, the same as that of Lake Michigan; it is twenty-one feet below the level of Lake Superior, eight feet above that of Lake Erie, and 334 feet above that of Lake Ontario. The maximum depth of its waters is 802 feet, and the area of its basin, including its surface, is about 74,000 square miles. It receives the waters of Lake Superior through the Saint Mary's River, and the waters of Lake Michigan through the Strait of Mackinac.

Through Saint Clair River, Lake Saint Clair, and the Detroit River, it discharges into Lake Erie.

The shore line is generally low, but along the southeastern coast picturesque cliffs rise to a height of 150 feet. The waters are remarkably clear and contain an abundance of fish, of which the most important is whitefish. Of the small islands which dot its surface in the north, Mackinac Island in the United States and Grand Manitoulin in Canada are the most important. Owing to violent storms, the lake is dangerous for navigation from December until May.

[See *GREAT LAKES*, for chart showing comparisons of the five Great Lakes with respect to size, elevation, and depth.]

**HURONIAN, hu ro' ne an, SERIES.** See *PROTEROZOIC ERA*.

**HURON INDIANS.** See *INDIANS, AMERICAN* (*Families or Confederacies*).

**HURRICANE**, a violent and destructive windstorm of the tropics. Nearly seventy per cent of these storms occur in the West Indies

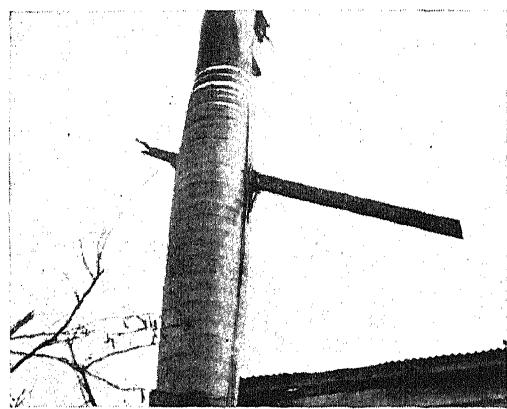


Photo: Wide World

#### A HURRICANE'S TREMENDOUS FORCE

In Cuba, a rafter from a demolished house was driven through the trunk of a palm tree.

and the China Sea, during the months of August, September, and October. Those in the China Sea are known as *typhoons*. The typical hurricanes begin in the warm Atlantic belt north of the equator and sweep across the West Indies to the coast of the United States; some turn to the northeast, and are dissipated in the Atlantic while moving toward Europe, but many pass into the Mississippi Valley by way of the Gulf of Mexico. In the beginning, the diameter of the storm area is from 100 to 300 miles, but it may increase to a thousand miles or more.

The approach of a hurricane is heralded by an ominous stillness in the atmosphere. Then follow light breezes, which increase to high winds, and when the storm breaks in its fury, the wind blows at the rate of eighty-five or

even a hundred miles an hour, while rain falls in torrents. The wind whirls in a spiral around a center of low pressure, and in that center no wind is perceived, as the current is upward; this area of low pressure is sometimes called the *eye of the storm*. The intensity of the gale is greatest near the place of its origin, and it diminishes as the diameter of the circle covered increases. Any very severe wind is often miscalled a hurricane.

The fury of a tropical hurricane is almost indescribable; in its path, ships are torn from their anchors, substantial buildings are blown to pieces, fruit and sugar plantations are destroyed, and great trees are uprooted; and the waves whipped up on the sea by hurricane winds are the largest known to mariners. The two most destructive hurricanes within recent years in the United States occurred in 1926 and 1928 in Florida (see *FLORIDA*). Hurricanes are closely related to the destructive tornadoes that occur in the Mississippi Valley, but the tornado has a smaller diameter and is more violent than the hurricane. Both are classed as cyclonic storms.

R.H.W.

**Related Subjects.** The reader is referred in these volumes to the article *WIND*, and especially to *CYCLONE*; *TORNADO*; *TYphoon*.

**HURST, FANNIE** (1889- ), an American novelist of Jewish descent, whose characters are taken largely from the "common, everyday walks of life." She was born in Saint Louis, Mo., and was educated in Washington University in that city and in Columbia University, New York. To gain material for her stories, she has worked in department stores, has made special studies of the stage and of its frequenters, has been a waitress, has visited Bolshevik Russia, and once made a trip across the Atlantic in the steerage. She draws striking pen pictures, and perhaps no present-day novelist has a larger following. Miss Hurst is the wife of Jacques S. Danielson.



Photo: U & U

FANNIE HURST

**Her Best Books.** The book which made her most famous was *Humoresque*; dramatized for moving pictures, this was an outstanding success. The magazine *Liberty* awarded her \$50,000 in a competition for *Mannequin*, which was also made into a film. Other productions are *Gaslight Sonatas*, *The Vertical City*, *Stardust*, *Lummox*, *Appassionata*, *Song of Life*, *Five and Ten*, and *A President Is Born*. In comedy drama, she also produced *Land of the Free* and *Buck Pay*. Her short stories appear regularly in magazines.











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